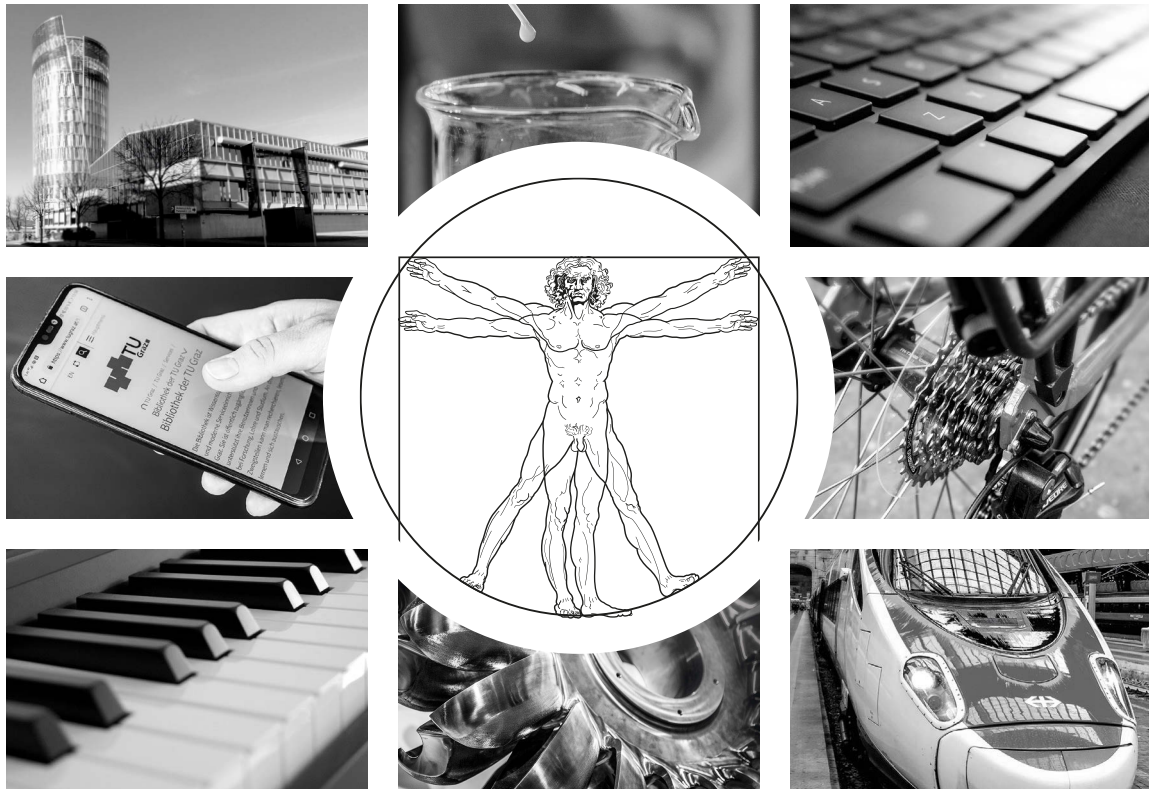SCIENCE, TECHNOLOGY AND SOCIETY

Günter Getzinger | Michaela Jahrbacher | Franziska Häller (eds.)

Conference Proceedings of the STS Conference Graz 2023

Critical Issues in Science, Technology, and Society Studies

8 – 10 May 2023

TU Graz

Preface

Critical Issues in Science, Technology and Society Studies

Conference Proceedings of the STS Conference Graz 2023, May 8th – 10th

The annual STS Conference Graz provides a space for scholars from all parts of the world to present and discuss their research with peers. In their papers, the conference participants address the complex ways in which science, technology and society coevolve and mutually shape one another. Without exception, the participants of the conference aim to provide a better understanding of the world(s) in which we live. This includes the assessment of emerging technologies, the scrutiny of ethical, legal and social aspects of contemporary scientific practices as well as the transition to environmentally friendly and socially desirable techno-scientific futures.

This volume of proceeding documents is part of the work that has been presented at the 21st STS Conference in Graz in 2023. It presents the wealth of ideas discussed at this occasion and fosters collaboration. The STS Conference Graz is the joint annual conference of the Science, Technology and Society (STS) Unit at Graz University of Technology, the Interdisciplinary Research Centre for Technology, Work and Culture (IFZ) and the Institute for Advanced Studies on Science, Technology and Society (IASSTS).

Find the Book of Abstracts at the DOI: 10.3217/978-3-85125-955-1

Contents

**Thematic Field C:
Towards Low-Carbon Energy Systems and
Fighting Climate Change**

Thematic Field F:
Sustainable Food Systems

Thematic Field A:

Open Science: Rethinking the Science and Society Relationship

Countering science skepticism by means of citizen science
– The ultimate solution?

Barbara Heinisch[1]

[1]Centre for Translation Studies, University of Vienna, Austria

Abstract. Research suggests that citizen science can improve the relationship between science and society. Citizens are involved in one or several steps in the academic research process, and sometimes also in decision-making. In addition to the effects found previously, such as increasing public understanding of science and the acquisition of subject-specific knowledge and methodological skills among participants, the question still remains whether citizen science can counter science skepticism. Based on a qualitative comparative analysis of literature, the potential of citizen science to counter science skepticism is discussed. After examining the promises of citizen science and general measures to alleviate science skepticism, the role and challenges of citizen science projects are investigated along the lines of changes in attitude, psychological effects, the role of participation and the importance of (science) communication as well as the benefits for the participants. The results show that citizen science can help counter science skepticism in several respects in addition to the role of (science) communication. While these findings need to be confirmed by empirical research, they still provide a basis for the discourse on the relationship between science and society and the role of citizen science in combating science skepticism in Europe.

Keywords: science-society relationship, participatory research, community research, value, academia

1 Introduction

Science enjoys high popularity, also in the public discourse. The coronavirus pandemic has highlighted this fact. During the pandemic, experts were not only visible in traditional media but also informed policymaking. However, the pandemic also revealed the science skepticism among the general public who did not trust the information provided by scientists and the government (Rutjens et al. 2021).

Nevertheless, also before the pandemic, science has been part of public discourse in which light is shed on the responsibilities of academic institutions and researchers towards society, including policy, economy and social issues. Policies and measures are regulating academic research and innovation. Other issues that academia is confronted with are anti-scientism movements rejecting the outcomes of academic research (Bucchi 2004, 1), as well as science skepticism.

Science in Europe dates back to the 17th century. This period was characterized by the scientific revolution, which itself was defined by the use of distinct procedures for engaging in science, including experimentation, the non-hierarchical nature of knowledge, i.e. that scientists engage in analysis and not relying solely on the writings of previous scholars, a constantly developing methodological repertoire for studying nature and the significance of exchanging knowledge (Bucchi 2004, 11).

As science developed, so did its institutionalization and the formation of a social group, i.e. the scientists, who formed rules within their community and gained social status (Bucchi 2004, 12). This process of professionalization and institutionalization created a social subsystem for science (Bucchi 2004, 14). This subsystem was also endowed with a certain prestige to which knowledge and wisdom was attributed. This attribution of knowledge has relations to the deficit model (Layton 1993), which was prevailing in science communication for some time. It states that the public has a knowledge deficit and needs to be educated by knowledgeable scholars.

Science education and scientific literacy emerged from this idea. Scientific literacy includes knowledge of facts of science, knowledge of the methods used in science and an appreciation of the scientific outcomes, while not resorting to opinions or superstition (Bauer 2009, 223). However, academics have often put too much emphasis on the knowledge, i.e. facts that science produced and not so much on the methods on which it is relying. Scientific literacy thus especially includes knowledge of the academic process, the uncertainty involved, controversies led and the replication of results (Bauer 2009, 223).

1.1 Citizen science

1.1.1 Definition of citizen science

Citizen science describes the involvement of members of the public, who are non-professional researchers in the related field into academic research (Haklay et al. 2021, 14). Since citizen science plays a decisive role in European funding strategies, the definition of the European Union is given here: "Citizen science can be described as the voluntary participation of non-professional scientists in research and innovation at different stages of the process and at different levels of engagement, from shaping

research agendas and policies, to gathering, processing and analyzing data, and assessing the outcomes of research" (European Commission and Directorate-General for Research and Innovation 2020, 1).

This reference shows that participants may be engaged in different research steps, ranging from data collection, data analysis to the publication and dissemination of the results. Typical examples can be found in the natural sciences, where members of the public are, for example, reporting their sightings of wild animals in urban environments by means of an app (Walter and Zink 2017) or they are taking and analyzing freshwater samples (Strobl et al. 2019), or they might also be co-authors of academic publications (Guerrini et al. 2019). However, citizen science does not only enjoy popularity within the natural sciences (Frigerio et al. 2021), but is gaining ground in other fields of academic research as well, including health science (Wiggins and Wilbanks 2019) (where participants collect their health data or contribute their experiences, among others), social sciences (Albert et al. 2021) (that look back on a long tradition of participatory research anyhow), the humanities (Heinisch et al. 2021) , in which citizen science was also already practiced before the advent of the term 'citizen science'.

The primary objective of many citizen science projects is the advancement of knowledge about a certain topic or field. Other, broader objectives of citizen science projects might be social change, an enhanced relationship between science and society, or a higher degree of public understanding of science among the general public. For this, citizen science projects need to adjust the project design, the measurement of outcomes, engage new groups of people and open up new trajectories for research (Bonney et al. 2016).

The range of activities in which citizens can be involved in academic research is broad, ranging from microtasks (within the meaning of crowd-sourcing being characterized by a large number of people contributing a small share to the overall project, such as classifying images, in which every participant completes small, clearly defined tasks), broader tasks, such as annotating text that require additional subject-specific knowledge to the entire co-creation (Bonney et al. 2009) of a research project from scratch with academics. Participants in citizen science projects are therefore involved in e.g. data collection, data analysis, playing games and preparing evidence for policymakers.

1.1.2 Approaches to citizen science

Due to the increasing popularity of citizen science in many disciplines, it is important to distinguish between citizen science and other forms of public engagement in science. The European Union has a broad understanding of public engagement in science. While linking it to Responsible Research and Innovation (RRI), the European Commission emphasizes the role of public engagement to create a livable and desirable future for

everyone with regard to science and technology and to include as a diverse range of actors as possible in science and technology development (European Commission 2020).

Other authors (Martin 2017, 143–144) differentiate between public engagement and public participation in science. While public participation in scientific research contributes to the advancement of academic knowledge, public engagement in science might rather focus on science communication (Martin 2017, 143–144).

Another differentiation worth mentioning is the difference between citizen science and community science. Community science, civic science or community-driven science is usually initiated and guided by a certain community (Haklay 2015, 15), who might approach academic researchers to help them to tackle a certain issue. In comparison, citizen science is generally understood as a researcher-driven academic endeavor, for which a researcher has a certain topic or research question in mind and requires the support of members of the public to address this question. Nevertheless, the boundaries between these approaches are often blurred. In this study, however, the term 'citizen science' will be used to describe the engagement of members of the public in academic research that is initiated and driven by academic researchers.

2.1 Science skepticism

2.1.1 Definition of science skepticism

Different terms are used to denote negative attitudes towards science covering a broad spectrum of constructive criticism to a general rejection of the academic system (Peters et al. 2023). Often, science skepticism has a negative connotation referring to its destructive nature, as the definition by Rutjens et al. (2022, 102) shows: Science skepticism is the "[s]ystematic and unwarranted rejection of science".

Other terms used to denote negative attitudes towards science are science criticism, distrust of science, science-related populism, or science denial, among others, which are often used interchangeably with science skepticism. For Peters et al. (2023), the distinguishing characteristics of science skepticism are that science skepticism is usually related to general distrust in science and can relate to skepticism towards certain theories or to the general rejection of science or its methods. Whether science skepticists are generally open towards science is unclear (Peters et al. 2023). Although skepticism can also have a positive connotation related to legitimate skepticism, in this article, the definition by Rutjens et al. (2022) given above is used.

Science skepticism is dynamic which is also illustrated by the fact that skeptical attitudes often depend on the relevant scientific topic. For example, in some regions, climate

change skepticism correlates with political conservatism or vaccine skepticism with scientific literacy and spirituality (Rutjens et al. 2022, 102).

Although skepticism is often framed rather negatively, it is also an inherent element of science itself.

2.1.2 Legitimate skepticism

Skepticism, especially organized skepticism (Merton 1957, 646) is an important element of academic enquiry, i.e. a value in science. Researchers should engage in skeptical behavior and "be critical of [their] own practice" (Normand 2008, 47). Skepticism is also part of legitimate debate since "organized skepticism and open critical discourse are essential features of science and of a democratic society" (Starkbaum et al. 2023, 2).

2.1.3 Attitudes towards science and science skepticism in Europe

The overall sentiment in Europe towards science is a positive one. A Eurobarometer survey showed that almost 90% of the citizens in the European Union consider the influence of science on the European society a positive one. Especially certain technologies are believed to improve the way of life. Nevertheless, the Eurobarometer respondents do not think that everybody in the European Union benefits equally from the developments in the fields of science and technology. More than half of the respondents stated that science and technology benefits only those who are already privileged and almost one quarter believes that the needs of women and men are not taken into account equally. The respondents have a positive perception of scientists since they associate intelligence, reliability and collaboration with them. However, almost 70% of the surveyed EU citizens stated that they are in favor of more evidence-based decision-making in the field of politics. Here, they see it as the scientists' responsibility to intervene. Regarding the involvement of members of the public in academic research, which has a clear relation to citizen science, 61% approve this idea in order to generate science and technology meeting the values and needs of members of the public (European Commission 2021). In the Eurobarometer 2021 survey, science skepticism is assessed by the relevance of science in the everyday life of the respondents or the contribution of science to future prosperity (Starkbaum et al. 2023, 2).

A survey addressing the situation in Austria draws a similar picture, but only to a limited extent. Although Austrians are quite skeptical about science, more than half of them are interested in academic knowledge and academic research. For two thirds, information about academic research is important, but only 37% think that they are well-informed. One third does not really trust science. 37% rather trust their common sense instead of academic findings. The respondents expressed criticism of science as they assume a strong influence of politics and business on academia. Persons who did not experience

a certain degree of education are twice as likely to be skeptical towards academic knowledge and academia. Nevertheless, and similar to the results of the Eurobarometer study, the majority of the respondents think that academics are qualified and competent. However, the respondents also believe that in an open society, it should be allowed to scrutinize everything, and even question science (ÖAW 2022; Starkbaum et al. 2023, 2).

2.1.4 Reasons for science skepticism

Science skepticism is not a uniform phenomenon. It is rather characterized by heterogeneity. Rutjens et al. (2022, 102) spot three different factors contributing to this heterogeneity: The predictors of science skepticism, the domains of science skepticism and cultural differences. Skepticism depends on ideologies and beliefs. Furthermore, there are differences in skepticism between domains, e.g. climate change or genetic modification. Furthermore, cultural differences can explain the variety of attitudes and beliefs related to science skepticism. Therefore, there is a variation of science skeptical attitudes in different countries, regions and depending on the scientific topic, such as climate change, vaccinations or genetic engineering (Rutjens et al. 2022, 102). An important indicator for negative attitudes towards science is mistrust in science (Peters et al. 2023, 10).

In contrast to science skepticism, which is rather heterogenous, science denial is a homogenous phenomenon: Regardless of the scientific information or fact that is provided, there is denial. Scientists may even face attacks, either in the professional or private realm. In addition, denial is often politically motivated (Lewandowsky et al. 2016, 538).

Starkbaum et al. (2023, 5) identify eight factors of science (and democracy) skepticism in Austria, including the framing of skepticism itself (i.e. any criticism is considered skepticism), the circumstance that citizens do not see the presence of science in their lives, the fact that criticism of science is present in all societal groups, the interrelation between criticism of science and criticism of democracy, the low level of science communication and reflection within academia (referring to contradictory results or the influence of interests on academia), changes in the public sphere and media challenging the function of science in society as well as Austria's relationship to science throughout history.

2 Method

The overarching research question is: How can citizen science decrease science skepticism in European societies? Answering this research question is important because citizen science is enjoying increasing popularity. In addition, many stakeholders, including researchers engaging in citizen science, citizen science networks, funding bodies and governmental organizations are claiming a plethora of promises of citizen science. These promises include, among others, an improved relationship between science and society ('operationalized' as, e.g. enhancing the trust between science and society and reducing science skepticism). Therefore, the aim of the article is to find evidence for these claims in the literature with a focus on citizen science as a means to counter science skepticism and discuss the resulting implications for citizen science practice. For this, a literature review and qualitative comparative analysis were conducted. Literature was searched on Web of Knowledge (April 2023) by using a combination of the keywords "citizen science" and "science skepticism", including different language variants. Additional key words were used to replace "citizen science" ("crowd science", "community* science", "participatory science"). After assessing the resulting 123 titles and abstracts for their suitability to answer the research question, especially if they had a clear relation to citizen science (and not science overall), the publications were categorized according to the following topics: General suggestions to counter science skepticism, promises of citizen science (for countering science skepticism), challenges of citizen science (especially those related to increasing science skepticism) and concrete measures or effects of citizen science. The core findings related to the activities, framework conditions and benefits are presented in the following sections.

3 Results

3.1 Promises of citizen science

The promises citizen science holds are, among others, that it increases the public understanding of science (Bonney et al. 2016), that participants acquire disciplinary knowledge and competences for scientific reasoning (Pandya et al. 2018), and more generally, to improve the relationship between science and society (Franzen 2019). Citizen science can also achieve greater impact, for example, by reaching the Sustainable Development Goals (Fritz et al. 2019) and thus contribute to a greater good. Also, the European Commission is highly supportive of citizen science as it considers citizen science a means to strengthen society's trust in science through interaction between citizens and academic researchers. As such, citizen science, according to the

European Commission, may enhance the effectiveness and relevance of research and innovation, improve quality and creativity, make research and innovation more transparent, and increase the public's confidence in research (European Commission and Directorate-General for Research and Innovation 2020, 1).

3.2 Living up to promises

The European Citizen Science Association (ECSA) highlights the knowledge gain achieved through citizen science. Other authors consider citizen science entangled in the push for the democratization of science (Irwin 1995) on the one hand, and the academic freedom or autonomy of academic researchers, on the other. While public engagement in research and innovation processes should better align the needs and expectations of society with research (Bauer et al. 2021, 343), it may also jeopardize the academic freedom and the autonomy of researchers since full participation in academic research would also mean that non-academics have a say in the decisions on what deserves to be investigated in research (and what does not) (Suomela 2014, 184). Another challenge in citizen science is the extent to which citizens can obtain an insight into academia.

In addition, persons or organizations engaging in or promoting citizen science might have different agendas, ranging from the agenda of the researchers, who may want to advance knowledge in a certain field, the agenda of funding bodies who want to address certain topical issues and the agenda of other stakeholders involved in the process. Depending on the topic and aim of the project, citizen science might involve different participants, such as members of certain communities, municipalities, NGOs or industry who have different priorities as well. While researchers might focus on the advancement of knowledge in collective terms, they are also interested in publishing and presenting their research, thus having rather personal interests. On the other hand, participants might want to improve their environment or social status, for example. Other stakeholders, such as industry representatives might push their business sector and the related interests, while NGOs would rather focus on humanitarian, social and environmental justice and support. Given this variety of interests and expectations, can citizen science remedy science skepticism?

3.2.1 The typical citizen science participants

At the moment, the average participant in citizen science activities is white, male, well-educated and middle-aged (Pateman et al. 2021). Furthermore, studies suggest that there is a male bias in those projects addressing physical science, in online projects and projects fostering competition and roles with high responsibility (Pateman et al. 2021, 3).

This shows that the participants in citizen science are not representative for the entire population. Nevertheless, the citizen science community is aware of this fact and tries to

increase the public engagement of underrepresented groups. Examples of these initiatives include a working group on empowerment, inclusiveness and equity[1] of the European Citizen Science Association, whose mission is to attract more people having different backgrounds to citizen science and to allow these participants to shape projects. This should ensure that citizen science projects have a real-world impact and address the needs and concerns of a wide range of people. Moreover, researchers are addressing the processes in citizen science that lead to the exclusion of certain groups of people. Regarding inclusive and exclusive practices in citizen science, the five factors of exclusion according to Montanari et al. (2021, 3) are discrimination (based on a person's identity), geography (due to the place of residence), governance (related to a person's autonomy in making decisions), socio-economic status (related to income) and, finally, shocks and fragility (a person's vulnerability to risks of any kind). Considering the results from studies addressing science skepticism (Rutjens et al. 2022; Starkbaum et al. 2023), science skepticism can be found in all social groups. Therefore, inclusive citizen science practices can help to engage these groups and provide them with hands-on research experience.

3.2.2 Expectations, interests and benefits

Another challenge is to align the expectations of the participants with the objectives of the project. Especially the participants' motivation might change throughout a citizen science project, as explained above. While researchers might 'just' want to answer a research question, participants might want to see actual impact on their lives or might want to experience a contribution to a greater good.

Therefore, striking a balance between all interests and generating a win-win situation for all the persons involved, appears challenging. For researchers, it is important that they do not only focus on the academic outcomes of a citizen science endeavor, but that they also assess the benefits for the members of the public. From an academic point of view, these benefits might be science education and increasing scientific literacy among the general public. In addition, it may also include raising awareness for an issue and creating enthusiasm for research. From the participant's point of view, the benefits might be completely different, including being part of a community, engaging in dialogue, having their voice heard or influencing policymaking (Riesch and Potter 2014, 108).

Another aspect are the different understandings of citizen science and the different approaches applied to this field. Suomela (2014) differentiates between two views on citizen science. The first is the emancipatory-participative view, which is characterized by the intention to change the relationship between members of the public and academic research and knowledge. The second view is the instrumental-pragmatic, which sees

---

[1] https://www.ecsa.ngo/working-groups/empowerment-inclusiveness-equity/

citizen science as a means to achieve the goals of academic research. Here, the primary aim is not to change the relationship between science and society but to use citizen science as a method within the toolbox of researchers. These diverging views highlight the possible fields of tension that might arise when the researchers and participants in a citizen science project have a different understanding of the intended outcome, i.e. change in relationship vs advancement of academic knowledge. This again shows the significance of expectation management and clear communication throughout a project. If a citizen science project falls short of the expectations of the participants, a citizen science project can cause more harm than good regarding countering science skepticism and improving the relationship between science and society.

3.2.3 Insight into academia

Generally, the question arises whether citizen science can provide participants with a true research experience and provide a realistic glimpse into science. Some authors argue that citizen science might reduce the entire culture of academia to an academic method alone (Mirowski 2017).

Based on these ambivalent outlooks and before answering the question whether citizen science can serve as a remedy, we first address general measures proposed to counter science skepticism.

3.3 Measures to counter science skepticism

Suggestions for countering science skepticism or science denial are provided by Lewandowsky et al. (2016, 544), who propose three measures, including a) responding to the concerns regarding transparency and questionable practices in research, e.g. by adhering to modern standards of openness; b) bringing activities of politically motivated actors to undermine science to the attention of others and c) "skeptical members of the public must be given the opportunity to engage in scientific debate" (Lewandowsky et al. 2016, 544).

Based on a study in 24 countries, Rutjens et al. (2022) come to the conclusion that science skepticism can be countered by enhancing scientific literacy. However, the effectiveness of increased scientific literacy depends on the cultural context. To be really effective in choosing strategies for countering science skepticism, researchers and communicators need to understand its causes taking into consideration different cultural situations and domains. Moreover, the authors suggest to further investigate the relationship between spirituality and science skepticism. Moreover, an important aspect for the inclination to support science is faith in science (Rutjens et al. 2022, 112).

3.4 Citizen science as remedy for science skepticism?

This section is dedicated to the question whether and how participation in citizen science projects can help to alleviate science skepticism. Acar (2023, 1) argues that citizen science (which they termed crowd science) can counter science skepticism through the psychological impact on both the participants and observers who are not contributing to a citizen science project themselves but are hearing about it. Citizen science is a way to engage members of the public in academic research who can thus influence academic projects themselves.

The results of the aforementioned studies on science skepticism allude to misunderstandings about science among members of the public. This may be related to the opinion that academia is an elite who is working in the ivory tower and not considering the real-world needs of society. Citizen science might therefore be a promising means to open up this ivory tower to non-elites and address actual needs of members of the public. Furthermore, science is often considered as a way to approach the truth and find truth. However, science "is better seen as organized scepticism" (May 2011, 4685). As such, science is a journey that brings along a variety of uncertainties (May 2011, 4685). These uncertainties, and any contradictory academic results might even further increase science skepticism. Nevertheless, science skepticism can be decreased by learning about scientific methods and ways of addressing uncertainty in research and scientific discourse.

3.4.1 Changing attitudes

Learning outcomes found in studies on citizen science projects are a change in attitudes towards science, enhanced knowledge of science as well as the subject at hand and an enhanced understanding of the way science works (Aristeidou and Herodotou 2020, 10). Nevertheless, there is hardly any evidence if these changes result in a more positive attitude towards science and thus, in lower science skepticism. One study on a citizen science project in astronomy (Price and Lee 2013, 773), however, reported a positive change of attitudes towards science, especially with regard to attitudes towards citizen science endeavors and science news. In line with Rutjens et al. (2022), this study also found that the participants' increase in scientific literacy plays a role in this change in attitudes (Price and Lee 2013, 773).

In addition, science skepticism can also be countered by citizen science through psychological effects.

3.4.2 Psychological effects

A psychological effect resulting from citizen science is experiencing a feeling of ownership that can help reduce science skepticism. The reasons for this sees Acar

(2023) in the psychological effects of contributing to an endeavor or outcome. First, if people can participate in the creation of products or outcomes, they have a positive bias towards it. Therefore, self-created products have a higher value (Norton et al. 2012) as persons are experiencing feelings of competence during creation as well as a greater feeling of psychological ownership. This so-called IKEA effect (Norton et al. 2012) might therefore also be seen in citizen science since even small contributions to an endeavor cause this effect and result in more confidence in science and thus less science skepticism (Acar 2023, 2).

Second, if participants experience psychological ownership for a citizen science project, they may also engage in science advocacy (Acar 2023, 2). Participants may share information about a citizen science project on a positive note with their families and communities (Johnson et al. 2014). Therefore, participants in citizen science projects experiencing psychological ownership can engage in science communication and help counter misinformation related to science (Acar 2023, 2).

Third, non-participants might experience psychological effects of citizen science as well. By observing others, and following their empowerment, non-participants might also experience feelings of empowerment, acceptance of and identification with science as well as more trust in science. Therefore, increasing the visibility of citizen science endeavors can help to harness these psychological consequences among the general public (Acar 2023, 3).

This shows that participation can have an effect. Therefore, communication is crucial in citizen science projects. The communication by citizen science project researchers or communicators may thus also affect science skepticism. However, Acar (2023, 3) sees the main responsibility for the communication against science skepticism among policymakers and research organizations since they strongly depend on the public's trust in science.

3.4.3 The role of participation

Apart from these psychological effects, participation also has other implications. "Science is debate. And […] critical members of the public can partake in this debate" (Lewandowsky et al. 2016, 543). Moreover, participants can contribute their knowledge, experience and concerns to academic research. "Given that scientific issues can have far-reaching political, technological, or environmental consequences, greater involvement of the public can only be welcome and may lead to better policy outcome" (Lewandowsky et al. 2016, 540).

Citizen science can change the role of citizens from passive consumers of scientific results and their role as audience to active participants in the research process. This way, they may help to legitimize science in society (Hecker and Taddicken 2022) or increase

trust between science and the public (Strasser et al. 2019). However, there is no clear evidence for these statements so far (Peters et al. 2023, 14).

3.4.4 Importance of communication

There are various ways of countering science skepticism by means of (science) communication. Regardless of the step in which members of the public are engaged in academic research, i.e., topic definition, data collection, data analysis etc., communication is always key (Hecker 2022). Apart from communication being crucial for participant recruitment and retention as well as the quality of the citizen science project, communication is also key to create the aforementioned feeling of ownership and to establish a feeling of belonging and community. Furthermore, communication can also help to create a feeling of contributing to a greater good and to enhance scientific literacy.

A negative attitude towards science is not necessarily related to a lack of knowledge about science. Here, the deficit model in communication plays a role because it can become a self-fulfilling prophecy and even further increase the distrust between academics and the public. If researchers consider members of the public as deficient, who cannot be trusted, it creates mistrust on both sides, academia and society (Bauer 2009, 225). If there is no trust or confidence on both sides and there are false conceptions about each other, communication is misguided. This way, the public might be even further alienated from academics (Bauer 2009, 225). Therefore, this is a crucial aspect when assessing the relationship between science and society and investigating science skepticism.

Since science skepticism is not a homogeneous phenomenon, science should open up communication with other members of society characterized by dialog. Since science skepticism may be only related to a certain topic, communication plays an important role (Starkbaum et al. 2023, 6). However, to help counter science skepticism (and not worsening the situation), the stakeholders engaging in communication and public discourse require skills and training, including the ability to reflect on their own practices and interests. Additionally, they should be transparent in communication (Starkbaum et al. 2023, 6). Despite all its promises and the added value that citizen science can have for the participants, citizen science requires trained researchers who are well-versed in tackling the complexity of a citizen science project and the variety of issues it entails. Thus, well-trained researchers who are treating participants with respect, engage in mutual dialogue and are willing to adapt are the foundation for countering science skepticism by means of citizen science.

Communication in citizen science is not limited to the traditional dissemination of scientific findings in academic journals and during academic conferences. It is also characterized by the outreach to the public, by media and influencing stakeholders and

policymakers as well as creating change through research. Thus, impact might be crucial. In its most comprehensive form, citizen science might involve members of the public also in decision-making regarding the research design, the topics to be addressed, the research question to be answered or the method and means of publication to be selected, which again highlights the importance of the psychological effects of ownership and participation.

Science communication which targets negative attitudes towards science can have different objectives according to Peters et al. (2023): Science communication might work along two lines: increasing and strengthening trust and reducing negative effects of expressions of science skepticism (especially in the form of online communication). On the one hand, trust can be strengthened by communicating openly and clearly about the scientific process and uncertainties, by being transparent and engaging in open science. In addition, trust can be earned by public engagement in the scientific process, especially through citizen science. On the other hand, negative effects can be reduced by increasing the recipient's resilience towards misinformation through education, by prebunking, i.e. the process of debunking misinformation or sources before they strike, and addressing common misinterpretations and misconceptions regarding a topic already in the beginning. Furthermore, negative effects can be minimized by reacting to misinformation or disinformation through providing evidence-based facts or by supporting researchers being affected by public attacks.

However, to be effective in countering science skepticism, science communication measures must be targeted. Moreover, communicators must be aware of the fact that measures suitable for addressing one attitude can be counterproductive for another attitude (Peters et al. 2023, 17).

3.4.5 Value and appreciation

The way how researchers or communicators communicate in citizen science projects can have an effect on the participants' attitude towards science. Therefore, it "is also important to signal that the public's input is genuinely valued; otherwise, these initiatives might exacerbate skepticism rather than mitigate it" (Acar 2023, 3).

Within a citizen science project, communication can create a sense of belonging and a feeling of being part of a community with shared values and visions. Communication can also create ownership and help change attitudes. In addition, the appreciation of the participants in various forms can have implications for science skepticism. Appreciation might range from social rewards, such as co-authorship in academic publications or rankings to increased social status in the project, for example by being a mentor or senior participant (Dunn and Hedges 2013, 153). Furthermore, citizen science projects should be appealing to as a broad range of people as possible. This can help to engage persons

who are genuinely not interested in science. Projects can increase their appeal through gamification, monetary incentives or, as mentioned before, recognition (Acar 2023, 3).

3.4.6 Benefits

A crucial aspect for the success of a citizen science project, from the participants' point of view, is the benefits they see in the project. These benefits might be direct benefits, such as hedonism, indulging in a hobby, being part of a community or (perceived) meaningfulness and (social) relevance as well as a means for improving their personal environment. The latter is often characterized by community science projects and usually concerns questions related to environmental justice and social justice. Here, research has shown that children participating in eco citizen science projects benefit in terms of their development and increased environmental stewardship (Makuch and Aczel 2020, 219).

In the initial phase of participation, people are strongly driven by personal pursuits. These are the reasons why people are volunteering in the first place. These personal pursuits include personal interests, self-promotion, social responsibility, and self-efficacy. These refer to engaging in their hobby, gaining personal reputation or social advancement, and contributing to scientific knowledge gain as well as to nature conservation or pride for their local environment (Rotman et al. 2014, 230). During the course of participation in a citizen science project, these motivations tend to change. Over the course of the project, the trust in the project, including the researchers, the data quality, and the practices as well as aspects related to communication play an increasingly important role. Here, clear communication, a common goal and contributions that are valued by the researchers can be essential (Rotman et al. 2014, 231–232).

At a later stage in the project, participants might have already invested quite an amount of time and effort. For example, after participating in training, reading materials, and contributing to the project in different ways, participants require acknowledgement and appreciation. These can range from a personal note to the participants, acknowledgements in academic publications, access to knowledge and resources or empowerment, activism and influencing policies at different levels, from the local to the national or supranational levels (Rotman et al. 2014, 231–232). Therefore, long-term participation is characterized by a combination of personal and collaborative aspects. Addressing these different motivations becomes even more difficult when combined with the wide range of perceived and expected benefits of participants.

Citizen science can become a means for countering science skepticism if it can provide added value for participants. This added value can be the benefits, the relevance, the meaningfulness, and the impact they perceive following participation in a citizen science endeavor. However, since this perceived benefit differs between participants, might be

highly individualized and depends solely on the individual participant's assessment, it is hard for citizen science projects to meet everyone's expectations and needs. Nevertheless, clear communication throughout the project, feedback loops with and evaluation by the researchers and the participants in citizen science projects can help to identify, voice, and manage these expectations. Expectation management in citizen science can support researchers to counter disappointment and thus skepticism.

To sum up, in addition to the role of participation and communication, citizen science can contribute to lowering science skepticism. Here, it is crucial that participants see a (direct) effect on their personal lives, including psychological effects of ownership or belonging. Even small or very personal benefits from participating in academic research can make a difference.

The limitations of this study are the small number of articles reviewed and the focus on only one database. While some 'synonyms' for citizen science were used as keywords, synonyms for science skepticism would lead to more comprehensive results. Nevertheless, this study opens up questions for future research since it hints at the positive effect of citizen science on countering science skepticism. However, science skepticism is a complex phenomenon that might not be solvable by means of citizen science (alone).

4 Conclusion

Citizen science holds many promises, such as increasing public understanding of science, acquisition of subject-specific knowledge and scientific literacy among participants in citizen science projects. It may also help to change the relationship between science and society for the better. In this regard, citizen science can be an instrument to counter science skepticism throughout European societies. Despite the limitations of citizen science with regard to being inclusive, managing expectations and providing added value for the participants (or society), citizen science can change attitudes and draw on (psychological) effects of ownership, belonging, appreciation and empowerment. Since (science) communication is crucial to counter science skepticism, not only citizen science projects but any science-related stakeholder, such as researchers, research organizations or policymakers can contribute to a positive change of attitudes towards science.

References

Acar, Oguz A. (2023). Crowd science and science skepticism. Collective Intelligence 2 (2), 263391372311764. https://doi.org/10.1177/26339137231176480.

Albert, Alexandra/Balázs, Bálint/Butkevičienė, Eglė/Mayer, Katja/Perelló, Josep (2021). Citizen Social Science: New and Established Approaches to Participation in Social Research. In: Katrin Vohland/Anne Land-Zandstra/Luigi Ceccaroni et al. (Eds.). The Science of Citizen Science. Cham, Springer, 119–138.

Aristeidou, Maria/Herodotou, Christothea (2020). Online Citizen Science: A Systematic Review of Effects on Learning and Scientific Literacy. Citizen Science: Theory and Practice 5 (1). https://doi.org/10.5334/cstp.224.

Bauer, Anja/Bogner, Alexander/Fuchs, Daniela (2021). Rethinking societal engagement under the heading of Responsible Research and Innovation: (novel) requirements and challenges. Journal of Responsible Innovation 8 (3), 342–363. https://doi.org/10.1080/23299460.2021.1909812.

Bauer, Martin W. (2009). The Evolution of Public Understanding of Science—Discourse and Comparative Evidence. Science, Technology and Society 14 (2), 221–240. https://doi.org/10.1177/097172180901400202.

Bonney, Rick/Ballard, Heidi/Jordan, Rebecca/McCallie, Ellen/Phillips, Tina/Shirk, Jennifer/Wilderman, Candie C. (2009). Public Participation in Scientific Research: Defining the Field and Assessing Its Potential for Informal Science Education. A CAISE Inquiry Group Report. Center for Advancement of Informal Science Education.

Bonney, Rick/Phillips, Tina B./Ballard, Heidi L./Enck, Jody W. (2016). Can citizen science enhance public understanding of science? Public understanding of science (Bristol, England) 25 (1), 2–16. https://doi.org/10.1177/0963662515607406.

Bucchi, Massimiano (2004). Science in society. An introduction to social studies of science. London/New York, Routledge.

Dunn, Stuart/Hedges, Mark (2013). Crowd-sourcing as a Component of Humanities Research Infrastructures. International Journal of Humanities and Arts Computing 7 (1-2), 147–169. https://doi.org/10.3366/ijhac.2013.0086.

European Commission (2020). Public Engagement in Responsible Research and Innovation. Available online at https://ec.europa.eu/programmes/horizon2020/node/766.

European Commission (2021). Europeans strongly support science and technology according to new Eurobarometer survey. Press release. Available online at https://ec.europa.eu/commission/presscorner/detail/en/IP_21_4645.

European Commission/Directorate-General for Research and Innovation (2020). Citizen Science : elevating research and innovation through societal engagement. Publications Office of the European Union.

Franzen, Martina (2019). Changing science-society relations in the digital age: the citizen science movement and its broader implications. In: Richard Owen/Mario Pansera (Eds.). Responsible Innovation and Responsible Research and Innovation. Edward Elgar Publishing, 336–356.

Frigerio, Didone/Richter, Anett/Per, Esra/Pruse, Baiba/Vohland, Katrin (2021). Citizen Science in the Natural Sciences. In: Katrin Vohland/Anne Land-Zandstra/Luigi Ceccaroni et al. (Eds.). The Science of Citizen Science. Cham, Springer, 79–96.

Fritz, Steffen/See, Linda/Carlson, Tyler/Haklay, Mordechai/Oliver, Jessie L./Fraisl, Dilek/Mondardini, Rosy/Brocklehurst, Martin/Shanley, Lea A./Schade, Sven/Wehn, Uta/Abrate, Tommaso/Anstee, Janet/Arnold, Stephan/Billot, Matthew/Campbell, Jillian/Espey, Jessica/Gold, Margaret/Hager, Gerid/He, Shan/Hepburn, Libby/Hsu, Angel/Long, Deborah/Masó, Joan/McCallum, Ian/Muniafu, Maina/Moorthy, Inian/Obersteiner, Michael/Parker, Alison J./Weisspflug, Maike/West, Sarah (2019). Citizen science and the United Nations Sustainable Development Goals. Nature Sustainability 2 (10), 922–930. https://doi.org/10.1038/s41893-019-0390-3.

Guerrini, Christi J./Lewellyn, Meaganne/Majumder, Mary A./Trejo, Meredith/Canfield, Isabel/McGuire, Amy L. (2019). Donors, authors, and owners: how is genomic citizen science addressing interests in research outputs? BMC medical ethics 20 (1), 84. https://doi.org/10.1186/s12910-019-0419-1.

Haklay, Mordechai/Dörler, Daniel/Heigl, Florian/Manzoni, Marina/Hecker, Susanne/Vohland, Katrin (2021). What Is Citizen Science? The Challenges of Definition. In: Katrin Vohland/Anne Land-Zandstra/Luigi Ceccaroni et al. (Eds.). The Science of Citizen Science. Cham, Springer, 13–33.

Haklay, Muki (2015). Citizen Science and Policy: A European Perspective. Woodrow Wilson International Center for Scholars. Available online at https://www.wilsoncenter.org/sites/default/files/Citizen_Science_Policy_European _Perspective_Haklay.pdf (accessed 2/3/2016).

Hecker, Susanne (2022). Citizen science communication and engagement: a growing concern for researchers and practitioners. Journal of Science Communication, 2016, Vol.15(1) 21 (07), C09. https://doi.org/10.22323/2.21070309.

Hecker, Susanne/Taddicken, Monika (2022). Deconstructing citizen science: a framework on communication and interaction using the concept of roles. Journal of Science Communication, 2016, Vol.15(1) 21 (01), A07. https://doi.org/10.22323/2.21010207.

Heinisch, Barbara/Oswald, Kristin/Weißpflug, Maike/Shuttleworth, Sally/Belknap, Geoffrey (2021). Citizen Humanities. In: Katrin Vohland/Anne Land-Zandstra/Luigi Ceccaroni et al. (Eds.). The Science of Citizen Science. Cham, Springer International Publishing, 97–118.

Irwin, Alan (1995). Citizen science. A study of people, expertise and sustainable development. London [u.a.], Routledge.

Johnson, McKenzie F./Hannah, Corrie/Acton, Leslie/Popovici, Ruxandra/Karanth, Krithi K./Weinthal, Erika (2014). Network environmentalism: Citizen scientists as agents for environmental advocacy. Global Environmental Change 29, 235–245.

Layton, David (1993). Inarticulate science? : perspectives on the public understanding of science and some implications for science education. Nafferton, Studies in Education Ltd.

Lewandowsky, Stephan/Mann, Michael E./Brown, Nicholas J. L./Friedman, Harris (2016). Science and the public: Debate, denial, and skepticism. Journal of Social and Political Psychology 4 (2), 537–553. https://doi.org/10.5964/jspp.v4i2.604.

Makuch, Karen E./Aczel, Miriam R. (2020). Eco-Citizen Science for Social Good: Promoting Child Well-Being, Environmental Justice, and Inclusion. Research on Social Work Practice 30 (2), 219–232. https://doi.org/10.1177/1049731519890404.

Martin, Victoria Y. (2017). Citizen Science as a Means for Increasing Public Engagement in Science. 2015, Vol.37(6), pp.723-746 39 (2), 142–168. https://doi.org/10.1177/1075547017696165.

May, Robert M. (2011). Science as organized scepticism. Philosophical transactions. Series A, Mathematical, physical, and engineering sciences 369 (1956), 4685–4689. https://doi.org/10.1098/rsta.2011.0177.

Merton, Robert K. (1957). Priorities in Scientific Discovery: A Chapter in the Sociology of Science. American Sociological Review 22 (6), 635–659.

Mirowski, Philip (2017). Against citizen science. Available online at https://aeon.co/essays/is-grassroots-citizen-science-a-front-for-big-business.

Montanari, Madeleine/Jacobs, Liesbet/Haklay, Mordechai/Donkor, Felix Kwabena/Mondardini, Maria Rosa (2021). Agenda 2030's, "Leave no one behind", in citizen science? Journal of Science Communication 20 (06), A07. https://doi.org/10.22323/2.20060207.

Normand, Matthew P. (2008). Science, Skepticism, and Applied Behavior Analysis. Behavior Analysis in Practice 1 (2), 42–49.

Norton, Michael I./Mochon, Daniel/Ariely, Dan (2012). The IKEA effect: When labor leads to love. Journal of consumer psychology 22 (3), 453–460.

ÖAW (2022). Wissenschaftsbarometer Österreich 2022. Available online at https://www.oeaw.ac.at/fileadmin/NEWS/2022/PDF/Wissenschaftsbarometer_Oes terreich_c_OeAW.pdf.

Pandya, Rajul/Dibner, Kenne Ann/Editors/Committee on Designing Citizen Science to Support Science Learning/Board on Science Education/Division of Behavioral and Social Sciences and Education/National Academies of Sciences/Engineering/and Medicine (2018). Learning Through Citizen Science: Enhancing Opportunities by Design. Washington (DC).

Pateman, Rachel/Dyke, Alison/West, Sarah (2021). The Diversity of Participants in Environmental Citizen Science. Citizen Science: Theory and Practice 6 (1), 1–9. https://doi.org/10.5334/cstp.369.

Peters, Nicola/Peter, Evelyn/Biermann Kaija (2023). Kann Wissenschaftskommunikation einen Beitrag dazu leisten, Wissenschaftsskepsis und Wissenschaftsleugnung in Deutschland zu reduzieren? Ein Forschungsüberblick.

Price, C. Aaron/Lee, Hee-Sun (2013). Changes in participants' scientific attitudes and epistemological beliefs during an astronomical citizen science project. Journal of Research in Science Teaching 50 (7), 773–801. https://doi.org/10.1002/tea.21090.

Riesch, Hauke/Potter, Clive (2014). Citizen science as seen by scientists: Methodological, epistemological and ethical dimensions. Public understanding of science (Bristol, England) 23 (1), 107–120. https://doi.org/10.1177/0963662513497324.

Rotman, Dana/Hammock, Jen/Preece, Jenny J./Boston, Carol L./Hansen, Derek L./Bowser, Anne/He, Yurong (2014). Does motivation in citizen science change with time and culture? In: Susan Fussell (Ed.). Compilation publication of CSCW'14 proceedings & CSCW'14 companion. February 15 - 19, 2014, Baltimore, Maryland, USA, the companion publication of the 17th ACM conference, Baltimore, Maryland, USA. New York, NY, ACM, 229–232.

Rutjens, Bastiaan T./Sengupta, Nikhil/van der Lee, Romy/van Koningsbruggen, Guido M./Martens, Jason P./Rabelo, André/Sutton, Robbie M. (2022). Science Skepticism Across 24 Countries. Social Psychological and Personality Science 13 (1), 102–117. https://doi.org/10.1177/19485506211001329.

Rutjens, Bastiaan T./van der Linden, Sander/van der Lee, Romy (2021). Science skepticism in times of COVID-19. Group Processes & Intergroup Relations 24 (2), 276–283. https://doi.org/10.1177/1368430220981415.

Starkbaum, Johannes/Auel, Katrin/Bobi, Valentina/Fuglsang, Simon/Grand, Peter/Griessler, Erich/König, Thomas/Losi, Lucilla/Seiser, Fabian/Tiemann, Guido/Taschwer, Klaus/Unger, Martin (2023). Executive Summary Study on Causations of Science and Democracy Skepticism in Austria. Austrian Federal Ministry of Education, Science and Research. Available online at https://pubshop.bmbwf.gv.at/.

Strasser, Bruno J./Baudry, Jérôme/Mahr, Dana/Sanchez, Gabriela/Tancoigne, Elise (2019). "Citizen Science"? Rethinking Science and Public Participation. Science & Technology Studies, 52–76. https://doi.org/10.23987/sts.60425.

Strobl, Barbara/Etter, Simon/van Meerveld, Ilja/Seibert, Jan (2019). The CrowdWater game: A playful way to improve the accuracy of crowdsourced water level class data. PloS one 14 (9), e0222579. https://doi.org/10.1371/journal.pone.0222579.

Suomela, Todd Ernest (2014). Citizen Science: Framing the Public, Information Exchange, and Communication in Crowdsourced Science. PhD diss. University of Tennessee.

Walter, Theresa/Zink, Richard (2017). Project StadtWildTiere: Benefits and Constraints in the Involvement of Citizen Scientists. In: Proceedings of the Austrian Citizen Science Conference 2017. Frontiers, 76–78.

Wiggins, Andrea/Wilbanks, John (2019). The Rise of Citizen Science in Health and Biomedical Research. The American journal of bioethics: AJOB 19 (8), 3–14. https://doi.org/10.1080/15265161.2019.1619859.

Open Science? Conceptualizing Openness as an Emerging Moral Economy of Science

Thomas König[1], Eric Vilain[2] and Jonathan Edward LoTempio[1,2,3]

[1] Institute for Advanced Studies (IHS), Vienna, Austria

[2] University of California, Irvine, United States of America

[3] Institute on Comparative Regional Integration Studies, United Nations University

Abstract. In this paper we aim to address a few of the complexities that revolve around "openness" of science as an emerging moral economy of science. First, we briefly assess the current state of discussion when it comes to Open Science in the academic literature. We show that these discussions have begun a more analytical look at Open Science, yet the term remains tied to opinions and emotional response. Accordingly, we pose that a more distant perspective is needed. We establish that, since openness is the goal of Open Science, it provides a useful term for the coalescing of discussion. Indeed, this term can be used to identify an emerging moral economy within science. Then, we discuss why this is the case - the changing context, as well as the dynamics inherent in science as an enterprise. We finish this article with an initial discussion of how the use of this mode of thinking will impact science and the study of science. This positions us to consider the needs for the study of openness in science as a moral economy, the potential models which could be to assess different interpretations of openness, and finally the questions which this mode of thinking may help us ask.

1 Introduction

Is Open Science here to stay?[2]

In its present form Open Science is an explicit construct, emerging from its implicit home, rooted in the Mertonian norm of communalism of science, where "open" is used once, to

---

[2] This paper is the early result of our consideration of the discussion in three inspiring conference panels over two sessions in 2022 and 2023 that we had the opportunity to organize. We invited remarkably diverse contributions that shed light on how openness is currently discussed, and also implemented, across academic disciplines, which helped to move our thinking on Open Science and openness. We are grateful to the participants of the panels for those stimulating discussions, as well as the comments by two anonymous reviewers on an earlier version.

describe communication. Indeed, what can be thought of as Open Science is implicit to Merton's informative line: "Secrecy is the antithesis of this norm; full and open communication its enactment" (Merton, 1957, p. 557). This articulation is important due to the nature of current expressions that prompt our initial question. As of the beginning of the 2020 decade, Open Science stipulates that science be as open as possible, and as closed as necessary. This is a concession since it is not necessarily in an individual or a society's interest that everything be placed in public domain. Open Science is not neutral, hence tempering it is reasonable.

The prevalence of Open Science requires us to develop new modes of thinking to ensure that discussions do not get stuck in the muck of prior opinion. This can be done through distancing from the term but must be done in light of the goals of Open Science. In the following article, we make a case that openness is the goal of Open Science (section 2). Specifically, we argue that openness can be conceptually understood as an emerging moral economy of science. Based on this argument, we explore the factors that have been contributing to this emerging moral economy (section 3). While this article is restricted to this conceptual argument, we briefly discuss in the final section how this conceptual understanding of openness may serve to better frame study and advancement of Open Science (section 4).

2 The Need for Distance: The Case for a Move from Open Science to Openness

Open Science has become a rallying cry in science policy: there are myriad initiatives and movements under the umbrella term of Open Science that aim to make publications, data sets, methods, more open. Universities and research funding agencies have published policy documents that entail how to do Open Science (University of California, 2013; Ayris *et al.*, 2018; Ivy Plus Libraries, 2023; NIH, 2023); governments have set out to define Open Science strategies (OSTP, 2022; European Commission, 2023); the UNESCO has dedicated a recommendation on Open Science (UNESCO, 2021).

2.1 Open Science as a Policy Term

All the documents and initiatives referred to in the previous paragraph are laudable. Also, they indicate that Open Science is a topic in science policy that is to be taken seriously. Yet what is Open Science? UNESCO suggests that it is "about making sure not only that scientific knowledge is accessible but also that the production of that knowledge itself is inclusive, equitable and sustainable." While mostly in line with this ambition, the academic literature is more sobering: Open Science is "an ambiguous and deeply political concept", as Ross-Hellauer et al state (Ross-Hellauer *et al.*, 2022, p. 13).

Typically, policy papers concerned with Open Science follow an approach of "addition", that is: they identify different areas of scientific practices that can be, or are supposed to be, further opened. For example, the concept developed specifically for Austrian science policy identifies different areas in the scientific field, from "open access" and "open research data", through "open methods" and "open evaluation" to "open education" and "citizen science" (Mayer *et al.*, 2020).

At the policy level, this approach is sound, as it explicates the policy imperatives as well as the potential challenges for the respective field of action. Yet, from a sociology of science perspective, the approach lacks analytical depth. Specifically, a framework that allows one to distinguish between implicit and explicit positions, interests, and meanings that go along with different explications of Open Science is missing. A more analytical approach is needed -- one that allows us to understand the source of a specific claim to openness, what it entails, and what policy directions follow from it. To do so, the first crucial step is distancing, that is, the deliberate decision to look at Open Science as an object of (social) scientific explanation in itself – instead of being a topic that needs to be argued for.

This broadly follows the ambition of previous work that already attempts to look at Open Science from a more analytical perspective. For example, Fecher and Friesike examine Open Science literature and identify "iterative motives and patterns of argumentation that […] form more or less distinct streams", or, specifically, "five distinct schools of thought" (Fecher and Friesike, 2014, p. 18). And in their analysis of the (unintended) consequences of different policies aligned under the umbrella term of Open Science, Ross-Hellauer et al. provide important details about "those areas where Open Science implementation potentially endangers the aim of greater equity in science" (Ross-Hellauer *et al.*, 2022, p. 4).

The work of scholars such as Fecher and Friesike as well as Ross-Hellauer *et al.* can be understood as attempts to examine Open Science from a more distant perspective, i.e., a perspective that is interested in Open Science as an object of (social) scientific explanation. However, in some crucial aspects, both contributions are still somewhat stuck half-way through. While it provides a useful overview of "schools" of Open Science, the article by Fecher and Friesike does not include a methical approach to sort through different utterances and texts concerning Open Science. Similarly, while Ross-Hellauer *et al.* achieve an important change of perspective by looking at the unintended consequences of Open Science, their work is motivated to identify "inequities" produced by Open Science policies in order to "re-orient implementation strategies and optimize outcomes wherever possible and desirable" (Ross-Hellauer *et al.*, 2022, p. 4). Neither of them sets the emergence of Open Science in a broader historical context, and neither

achieves a more analytical approach towards the forces and arguments underlying Open Science as a political concept.

2.2 Openness: The Goal of Open Science

To get a full and analytically coherent understanding of Open Science, we suggest abstaining from the notion of Open Science and instead focus on openness. This is not a merely rhetorical shift. Open Science has become a powerful, yet also ambiguous, term in its own right in the world of science policy. This is clearly expressed by the capital letters that are used when it is written. However, to look at Open Science from an analytical perspective requires understanding the intent of those who use or oppose the intent of Open Science. What, then, is the goal of Open Science? In short, the goal is openness. This statement might be perceived as being almost tautological, but it is important to make nonetheless: If Open Science is a political term, openness is the term that describes the (implicit) goal of Open Science.

Our suggestion to shift from Open Science to openness is to be understood as a deliberate form of analytical distancing: openness allows for the address of a policy goal without muddling the support or opposition that may be paired with Open Science. Openness is the vision of a future of science (or aspects of the scientific endeavour) that serves as the foundation of the policy term Open Science. We deem it therefore more appropriate for analytically approaching policy instruments, and (more broadly) policy statements and initiatives directed at Open Science. At this point of our analysis, however, openness is hardly more precise or specific than Open Science.

To give openness a conceptual meaning, we suggest to interpret it as a relatively new facet of the ever emerging "moral economies" of science. Specifically, we refer here to an important aspect of the scholarship by Lorraine Daston. Daston, an eminent historian of science, has described moral economies as "web[s] of affect-saturated values that stand and function in well-defined relationship to one another… a balanced system of emotional forces, with equilibrium points and constraints" (Daston, 1995, p. 4). These moral economies refer to the ethical and values-based considerations that underpin and shape the practices, norms, and governance of a particular domain or field. They encompass the moral principles, beliefs, and ideals that guide the interactions, decision-making, and distribution of resources within that domain.

Daston details a few historical examples along which the moral economies of science have been changed (and, arguably, resulted in the modern-day shape of distinct "norms" famously described by Merton (1957).[3] Specifically, she looks at the concepts of

---

[3] It should be noted that Daston herself has commented rather critically on Merton's norms, suggesting that those were "immune to the vagaries of history and the pressures of context", while moral economies

"quantification", "empiricism" and "objectivity" that, in the history of science, have been controversially discussed, until eventually a common understanding has emerged. Like the build-up of new stone from sedimentary dust, sediments in science are the common understanding of the concepts that inform scientific practices, which built on the previous layers of progress. Like these rocks, science is evolving, and so too are its moral economies.

Having said all this, openness is not a new trend within science at all (as indicated already with reference to Merton in the introduction of this article). When it comes to sharing results, but also methods, even the old Mertonian norms have implied the replicability of experiments and results – at least in theory. Yet the fact that openness is now specifically mentioned and contested, implies that this once nested concept has become itself a top-level concern in many corners of the scientific endeavour, and one that is put into the spotlight. Openness describes the claim to make different (and potentially all) aspects of scientific practices transparent, inclusive, and accessible. This warrants two questions: why is this happening, and how does this potentially impact the future course of the scientific endeavour?

While we think that both questions require a detailed answer, the remainder of this article is limited to tackling the first question (while addressing the second question, albeit only in the most superficial way, in the discussion section). Specifically, the next section aims to unearth the broader context of why openness has become a topic of discussion (if not controversy) in science. Posing this question from a historical point of view allows us to zoom out of the current debates and investigate the material as well as discursive changes of the scientific endeavour. We take a global and general view that we think is necessary to see the broader patterns in the development of science.

3. Openness as a Moral Economy in the Making

The sharing of results and methical approaches has long been a key feature of promoting progress in science. In that sense, openness was among the first sedimented norms that determine scientific practices (at least when we take norms as stated by Merton in the first half of the 20th century). And yet, openness has transitioned from a facet of consideration within this sedimented set of norms to a concept which stands by itself (i.e., a moral economy in the making). Why? We attribute the answer to this question to three main factors:

"are historically created, modified, and destroyed; enforced by culture rather than nature" (Daston, 1995, p. 8). See, however, the convincing rebuttal by Weingart (2015, pp. 71–2), who argues that Merton himself was well aware of the historicity of those norms.

(1) Over the course of the past seven decades, the societal context in which science is embedded has entirely changed.

(2) As a related consequence, scientific practices have been developing in numerous niches and differentiated (or, fractalized) into many efforts, research fields, subdisciplines.

(3) The modality of doing science has fundamentally changed due to new media and communication formats, i.e., "digitalization".

Ad (1) Regarding the societal context, the importance that is assigned to science has enormously increased in the past seven decades (with increasing budgets alongside). A key point in transition from government-funded big military science to big civilian science was Vannevar Bush's Post-War report, *Science: the endless frontier* (Bush, 1945), which was later backed by economists with the argument that it is in the public interest to fund research (Arrow, 1962). From then on, science as an enterprise has become deeply intertwined with capitalism, and "innovation" has become the buzzword (Godin, 2012) along which entire governance architectures have been created (Borrás and Radaelli, 2011).

This economic importance of innovation has created vastly new opportunities for scientists, but attention has also increased efforts to put science under more and more scrutiny. New Public Management (NPM), a "synthetic definition of … hegemonic ideas" such as marketization, competition, and managerialization of research (Capano, 2022), has become the dominant force of regulating, policing and administrating science.[4] In that sense, openness is a result of, or demand from the increasing scrutiny under which the scientific endeavour is put. The sources of this scrutiny span funding agencies, the public, and scientists themselves, and each result in different interpretations of the needs and purposes of openness. At the same time, openness is also perceived as a business opportunity in the context of platform capitalism (Mirowski, 2018) and even a topic of geopolitical contestation (Sundell, 2021). The morality of "knowledge as a public good" is to be understood as an "economy of openness" (Bacevic and Muellerleile, 2018, p. 173).

Ad (2) The second factor is what has happened to science itself. Over the past 80 years, and not least because of the "magic" ascribed to it, science has solidified itself into a full-fledged subsystem of society – organizationally (Whitley, 2000) as well as politically (Kaldewey and Schauz, 2018) and economically (Stephan, 2012). This is largely an outgrowth of science as a state-funded endeavour in the post-1945 world. While it

---

[4] On a sidenote it should be mentioned that New Public Management is itself a popular and contested policy goal in science policy. The publications on the topic are numerous; besides the recent, informative overview by Capano (Capano, 2022), a comprehensive analysis of its impact on university systems can be found in the book by Bleiklie, Enders, and Lepori (2017).

includes the 'big science' of nuclear, space, and genome programs, it also includes all fields of study who benefit from the mechanisms of state sponsorship – and those are numerous.

On the one hand, this resulted in an exponential growth of new scientific knowledge, and hence academic publications, as already discovered in the 1960s (Price, 1986). On the other hand, science has seen many so-called scandals over the past decades, from outright fraud to the replicability crisis to all sorts of ethical issues (Fischer, 2008; Biagioli and Lippman, 2020). In this context, openness is perceived as a necessary tool to improve science,[5] and to better connect different strands in the scientific endeavour. Ideas about openly sharing data, methods, models, etc. have been invigorating scientists and policymakers alike.[6] If the intention was, at least partially, to make access to scientific knowledge cheaper, the perseverance of increasingly commercial and oligopolistic publishing houses (Larivière, Haustein and Mongeon, 2015) appears to put this in serious question (Bergstrom *et al.*, 2014). Another intention, to make access easier, is similarly put in doubt: Sci-Hub, arguably the largest provider of scientific publications (Greshake, 2017), is illegal in much of the world. Given the unintended consequences that came along with opening up access, the results on improving scientific practices appear to be mixed at best (Hagner, 2018).

Ad (3) Sharing has arguably been the initial form of applying openness to the scientific endeavour, what has initially been called "Open Access" dating back to the late 1990s (*Budapest Open Access Initiative*, 2002).[7] Yet today, openness entails much more than openly sharing publications, data sets, and models – it also encompasses core processes (like open peer review) and research practices (like citizen science). This changing (and expanding) meaning of openness is testament to it being an *emerging* moral economy. It also testifies that one key factor of its emergence is digitalization, that is, the availability, and increasing use, of new modalities of communication thanks to the internet. While this is most obvious in academic publishing (as indicated before), where the idea of libraries (holding a limited number of printed books and journals) has long been abolished by today's practices of texts of various length and format more or less freely circulating in the web (and within scientific communities), it is by no means limited anymore to this area.

---

[5] For example, access to administrative data appears to have an effect on the quality of research publications (Nagaraj and Tranchero, 2023).

[6] For the latest instance, one need only look to the coronavirus pandemic and the emergency scientific measures towards openness. Publications pertinent to the pandemic became free for all to use, fundamental data could be accessed on public facing repositories, and public funds were mobilized to build and to buy vaccines.

[7] For a retrospective assessment of the challenges and learnings from turning an existing field journal into Open Access mode, see König (2020).

The new opportunities have made possible new and creative ways of transdisciplinary research (Neundlinger *et al.*, 2023). Citizen Science is but one key word that highlights the attempts to engage with civil society and its representatives (Martinuzzi and Hametner, 2016), and to set up new forms of deliberation between scientific experts and 'mini-publics' (Blue, 2015). This is within the trend towards a more "transformative" research agenda (Schot and Steinmueller, 2018). At the same time, the inherent inequalities of what is sometimes called "academic capitalism" (Jessop, 2018) have only increased. At the minimum, digitalization has not changed the overall power dynamics within scientific disciplines, or reduced implicit hierarchies between world regions, all the while accelerating the race from doing research to publishing (Fochler, Felt and Müller, 2016; Vostal, 2016).

To summarize: as the spectacular growth of science is intertwined with a long tradition of economic expectations for "innovation", the increase of dedicated resources has raised questions about accountability; the diversification and fractalization of scientific endeavors has made it seem urgent to improve exchange and access to scientific publications and data; digitalization transforms the modalities of doing science. These developments and trends have put openness front and center, making it an emerging moral economy. This is not an automatic or natural process, but one which rests very much on initiatives of various actors, partly reacting to the three factors in time outlined above, and partly attempting to take advantage of them.

Those initiatives, which often intend to reform scientific practices and how they relate to society, explicitly refer to the concept of openness. It is those initiatives, then, that provide the empirical cases along which the development of openness can be examined, and along which the impact of this emerging moral economy on science can be assessed. To do so, an analytical framework is needed (see next section). Before that, it is necessary to state what should be obvious by now: by conceptualizing openness as an emerging moral economy of science, we want to gain some distance from the research object Open Science. But it also does not make sense to dismiss Open Science as merely an accommodation to platform capitalism and neoliberalism, as others have suggested (Mirowski, 2018). Instead, we prefer a more pragmatic stance of inquiring openness.[8]

A second statement refers to the inherent characteristic of openness as an emerging moral economy: unlike the norms already sedimented in the conduct of scientific practices, including Daston's "objectivity", "quantification", or "empiricism", openness is not about the proper conduct of science *per se*, but about the relationship of science to the public, and to itself. The call for openness relates science to itself, to the public, and

---

[8] Our own epistemological background here is informed by what can loosely be called "pragmatist sociology" (Bénatouïl, 1999; Reckwitz, 2021; Gross, Reed and Winship, 2022).

to the actors who set the conditions for their continued research. This call itself can be determined by the public funding of research. Thus, the actors, norms, values, and systems are present and in well-defined relation – a moral economy, but one not explicit to the extant norms.

4. Discussion

How is the emergence of openness as a moral economy impacting science? This is the second research question formulated in the introduction, one that follows once we have established that openness is indeed – as we have shown – a moral economy in the making. It is, unfortunately, also a research question that we can only briefly touch upon here as a view to the future. Within the context of Open Science, understanding openness as a moral economy involves recognizing and critically examining the ethical dimensions and moral obligations associated with openness in scientific research and knowledge dissemination. It entails exploring the values and principles that govern the conduct of researchers, institutions, and other stakeholders involved in Open Science initiatives.

The moral economy approach also prompts reflection on the responsibilities and obligations of researchers and institutions within the framework of Open Science. It considers questions of integrity, accountability, and the social contract between science and society. These questions will have related, but different answers at each level of society from the local to the global. Use of this perspective will encourage deeper engagement with the ethical dimensions of openness, fostering discussions on issues such as data sharing, research ethics, authorship, and the dissemination of scientific findings in a manner that upholds moral values and societal well-being. This has already begun to impact the course of the scientific endeavour – and shows no sign of stopping.

There is a need for the articulation and study of the models of openness to advance the study of the moral economy of openness. We end this article by suggesting three modes of analysis:[9] first, with the consideration of the positionality of actors under the chapeau of Open Science; second, with examination of the different levels and purviews of actors in Open Science, and third, the semantics, that is, the intent of words sometimes used synonymously with open, including transparency, frankness, and the concepts of FAIR (findable, accessible, interoperable, and reusable). Each of these modes of analysis requires a more detailed explanation. Each addresses a specific aspect of openness;

---

[9] As mentioned in the introduction, work on these modes of analysis are currently under development by our team, based on the discussions we nucleated at STS Graz 2022 and 2023 on the topic. We expect to explore these more deeply in future sessions at STS Graz, and in further manuscripts, and indeed hope that scholars in other disciplines will add their contribution to the literature in this vein.

together, they provide an analytical framework for empirically assessing case studies of Open Science in a coherent and systematic manner.

Embracing the notion of openness as an emerging moral economy may lead to a more critical, comprehensive, and conscientious approach to Open Science. By recognizing and addressing the ethical dimensions and obligations through analysis of openness, we can foster a scientific ecosystem that upholds integrity, accountability, and social justice. We think that the best lens for this is openness, and hope that it will serve to improve additive discussion while also providing firm sediment for evaluative consideration of Open Science. This will certainly help us to find a way to ensure that the policy goals implicit and explicit to Open Science can be realized in a useful, situationally aware manner. But which situations?

With a more analytical perspective and more distance from Open Science, we can ask hard questions while eliciting fewer feelings. For example, we can consider national differences and unintended consequences. What does a researcher owe the nation who funds them? What does the nation owe the researcher? What forces do the exert beyond the conditions of the funding? Furthermore, nations disagree on Open Science. Sometimes it is extractive and colonial, sometimes it can promote equity. The unintended consequences of Open Science extend past inter-state and inter-people relations – the openness of data can stymie innovation if data must remain private, or the closedness of data can prevent replicability. The scales seem to be tilted towards open because it is consonant with Open Science. This should be a more assessable question and can be better achieved with openness thinking. This will help us to express more clearly the obstacles to sharing, and the obstacles of privacy or closedness of data on the part of both participants and researchers.

5. Conclusion

Open Science is here to stay. It is too useful of a policy term, it is too sedimented into the common language. The ambition of this paper has been to provide a more distant, analytical perspective on Open Science as a science policy term which already has a huge impact on science itself as well as its relation to policymakers, businesses, and society as a whole. Providing more analytical perspective is aligned with previous research that has made first steps into this direction, but it aims to go beyond this by suggesting focussing on openness as the core concept undergirding the science policy term Open Science. Here we provide a first step towards understanding openness as something within the scientific endeavour that can be analysed with more analytical

distance and depth. Instead, we provide consideration and justification of openness as the goal of and emerging moral economy for the study of Open Science.

By viewing Open Science through the lens of openness itself as the goal of Open Science and, hence, an emerging moral economy in its own right, researchers (and, subsequently, policymakers) can more critically evaluate the potential consequences, benefits, and challenges associated with promoting openness towards Open Science. This perspective acknowledges the inherent ethical dilemmas and trade-offs involved in implementing open practices, including a transparency-privacy axis, promoting multi-stakeholder collaboration while respecting intellectual property rights, and ensuring access to knowledge while mitigating inequalities.

References

Arrow, K. (1962) 'Economic Welfare and the Allocation of Resources for Invention', in The Rate and Direction of Inventive Activity: Economic and Social Factors. Cambridge, Mass: National Bureau of Economic Research (NBER book chapter series), pp. 609–626. Available at: http://www.nber.org/papers/c2144 (Accessed: 18 October 2019).

Ayris, P. et al. (2018) Open Science and its role in universities: a roadmap for cultural change. Activity Report 24. Brussels: LERU. Available at: https://www.leru.org/publications/open-science-and-its-role-in-universities-a-roadmap-for-cultural-change (Accessed: 11 May 2023).

Bacevic, J. and Muellerleile, C. (2018) 'The moral economy of open access', European Journal of Social Theory, 21(2), pp. 169–188. Available at: https://doi.org/10.1177/1368431017717368.

Bénatouïl, T. (1999) 'A Tale of Two Sociologies. The Critical and the Pragmatic Stance in Contemporary French Sociology', European Journal of Social Theory, 2(3), pp. 379–396. Available at: https://doi.org/10.1177/136843199002003011.

Bergstrom, T.C. et al. (2014) 'Evaluating big deal journal bundles', Proceedings of the National Academy of Sciences, 111(26), pp. 9425–9430. Available at: https://doi.org/10.1073/pnas.1403006111.

Biagioli, M. and Lippman, A. (eds) (2020) Gaming the metrics: misconduct and manipulation in academic research. Cambridge, MA: MIT Press (Infrastructures series). Available at: http://mitpress.mit.edu/9780262537933 (Accessed: 25 January 2020).

Bleiklie, I., Enders, J. and Lepori, B. (eds) (2017) Managing Universities: Policy and
   Organizational Change from a Western European Comparative Perspective.
   Cham: Springer. Available at:
   http://ebookcentral.proquest.com/lib/univie/detail.action?docID=4933641
   (Accessed: 18 December 2020).

Blue, G. (2015) 'Public Deliberation with Climate Change: Opening up or Closing down
   Policy Options?', Review of European, Comparative & International Environmental
   Law, 24(2), pp. 152–159. Available at: https://doi.org/10.1111/reel.12122.

Borrás, S. and Radaelli, C.M. (2011) 'The politics of governance architectures: creation,
   change and effects of the EU Lisbon Strategy', Journal of European Public Policy,
   18(4), pp. 463–484. Available at: https://doi.org/10.1080/13501763.2011.560069.

Budapest Open Access Initiative (2002). Available at:
   http://www.budapestopenaccessinitiative.org/read (Accessed: 6 March 2018).

Bush, V. (1945) Science, the endless frontier: A report to the President. U.S. Govt.
   print. off.

Capano, G. (2022) 'Ideas and instruments in public research funding', in B. Lepori, B.
   Jongbloed, and D. Hicks (eds) Handbook of Public Research Funding.
   Cheltenham, UK: Edward Elgar, pp. 73–89. Available at:
   https://zenodo.org/record/6718069 (Accessed: 2 November 2022).

Daston, L. (1995) 'The Moral Economy of Science', Osiris, 10, pp. 2–24.

European Commission (2023) The EU's open science policy, Open Science. Available
   at: https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/our-
   digital-future/open-science_en (Accessed: 18 May 2023).

Fecher, B. and Friesike, S. (2014) 'Open Science: One Term, Five Schools of Thought',
   in S. Bartling and S. Friesike (eds) Opening Science: The Evolving Guide on How
   the Internet is Changing Research, Collaboration and Scholarly Publishing. Cham:
   Springer International Publishing, pp. 17–47. Available at:
   https://doi.org/10.1007/978-3-319-00026-8_2.

Fischer, K. (2008) 'Science and Its Malfunctions', Human Architecture: Journal of the
   Sociology of Self-Knowledge, 6(2), pp. 1–22.

Fochler, M., Felt, U. and Müller, R. (2016) 'Unsustainable Growth, Hyper-Competition,
   and Worth in Life Science Research: Narrowing Evaluative Repertoires in
   Doctoral and Postdoctoral Scientists' Work and Lives', Minerva, 54(2), pp. 175–
   200. Available at: https://doi.org/10.1007/s11024-016-9292-y.

Godin, B. (2012) '"Innovation Studies": The Invention of a Specialty', Minerva, 50(4), pp. 397–421. Available at: https://doi.org/10.1007/s11024-012-9212-8.

Greshake, B. (2017) 'Looking into Pandora's Box: The Content of Sci-Hub and its Usage', F1000Research, 6, p. 541. Available at: https://doi.org/10.12688/f1000research.11366.1.

Gross, N., Reed, I.A. and Winship, C. (2022) 'Pragmatist Sociology. Histories and Possibilities', in N. Gross, I.A. Reed, and C. Winship (eds) The new pragmatist sociology Inquiry, agency, and democracy. New York: Columbia University Press, pp. 3–31.

Hagner, M. (2018) 'Open Access, data capitalism and academic publishing', Swiss Medical Weekly, 148:w14600, pp. 1–8. Available at: https://doi.org/10.4414/smw.2018.14600.

Ivy Plus Libraries (2023) 'Ivy Plus Libraries Announce Support for Open Access to Federally Funded Research | Princeton University Library', Princeton University Library, 1 March. Available at: https://library.princeton.edu/news/general/2023-03-10/ivy-plus-libraries-announce-support-open-access-federally-funded-research (Accessed: 2 June 2023).

Jessop, B. (2018) 'On academic capitalism', Critical Policy Studies, 12(1), pp. 104–109. Available at: https://doi.org/10.1080/19460171.2017.1403342.

Kaldewey, D. and Schauz, D. (eds) (2018) Basic and applied research: the language of science policy in the twentieth century. New York: Berghahn (European Conceptual History). Available at: https://www.berghahnbooks.com/downloads/OpenAccess/KaldeweyBasic/9781785338113_OA.pdf.

König, T. (2020) 'Converting to Open Access. The Austrian Journal of Political Science (OZP) as a case study', Österreichische Zeitschrift für Politikwissenschaft, 49(3), pp. 1–6. Available at: https://doi.org/10.15203/ozp.3184.vol49iss3.

Larivière, V., Haustein, S. and Mongeon, P. (2015) 'The Oligopoly of Academic Publishers in the Digital Era', PLOS ONE, 10(6), p. e0127502. Available at: https://doi.org/10.1371/journal.pone.0127502.

Martinuzzi, A. and Hametner, M. (2016) Network Analysis of Civil Society Organisations' participation in the EU Framework Programmes. Brussels: European Commission - DG Research and Innovation. Available at: doi: 10.2777/71466.

Mayer, K. et al. (2020) 'Empfehlungen für eine nationale Open Science Strategie in Österreich / Recommendations for a National Open Science Strategy in Austria'. Available at: https://doi.org/10.5281/zenodo.4109242.

Merton, R.K. (1957) Social theory and social structure; toward the codification of theory and research. revised and enlarged edition. Glencoe, Ill.: Free Press.

Mirowski, P. (2018) 'The future(s) of open science', Social Studies of Science, 48(2), pp. 171–203. Available at: https://doi.org/10.1177/0306312718772086.

Nagaraj, A. and Tranchero, M. (2023) 'How Does Data Access Shape Science? Evidence from the Impact of U.S. Census's Research Data Centers on Economics Research'. National Bureau of Economic Research (Working Paper Series). Available at: https://doi.org/10.3386/w31372.

Neundlinger, K. et al. (2023) »Virtual Skills Lab« - Transdisziplinäres Forschen zur Vermittlung sozialer Kompetenzen im digitalen Wandel. 1. Auflage. Bielefeld: transcript (Digitale Gesellschaft, 58).

NIH (2023) 'Final NIH Policy for Data Management and Sharing'. Washington, D.C.: National Institutes of Health. Available at: https://grants.nih.gov/grants/guide/notice-files/NOT-OD-21-013.html (Accessed: 18 May 2023).

OSTP (2022) 'Guidance to Make Federally Funded Research Freely Available Without Delay', Office of Science and Technology Policy, 25 August. Available at: https://www.whitehouse.gov/ostp/news-updates/2022/08/25/ostp-issues-guidance-to-make-federally-funded-research-freely-available-without-delay/ (Accessed: 1 June 2023).

Price, D.J. de S. (1986) Little science, big science ... and beyond. New York: Columbia Univ. Press.

Reckwitz, A. (2021) 'Gesellschaftstheorie als Werkzeug', in Spätmoderne in der Krise: was leistet die Gesellschaftstheorie? 2nd edn. Berlin: Suhrkamp, pp. 23–150.

Ross-Hellauer, T. et al. (2022) 'Dynamics of cumulative advantage and threats to equity in open science: a scoping review', Royal Society Open Science, 9(1), p. 211032. Available at: https://doi.org/10.1098/rsos.211032.

Schot, J. and Steinmueller, W.E. (2018) 'Three frames for innovation policy: R&D, systems of innovation and transformative change', Research Policy, 47(9), pp. 1554–1567. Available at: https://doi.org/10.1016/j.respol.2018.08.011.

Stephan, P.E. (2012) How economics shapes science. Cambridge, Mass.: Harvard University Press.

UNESCO (2021) UNESCO Recommendation on Open Science. UNESCO. Available at: https://en.unesco.org/science-sustainable-future/open-science/recommendation (Accessed: 12 December 2021).

University of California (2013) 'UC Systemwide Academic Senate Open Access Policy', Office of Scholarly Communication, 24 July. Available at: https://osc.universityofcalifornia.edu/scholarly-publishing/uc-open-access-policies-background/systemwide-senate/ (Accessed: 14 May 2023).

Vostal, F. (2016) Accelerating academia: the changing structure of academic time. London: Palgrave MacMillan (Palgrave Studies in Science, Knowledge and Policy).

Weingart, P. (2015) Die Stunde der Wahrheit? Zum Verhältnis der Wissenschaft zu Politik, Wirtschaft und Medien in der Wissensgesellschaft. 4th edn. Weilerswist: Velbrück Wissenschaft. Available at: http://swbplus.bsz-bw.de/bsz442573375inh.htm (Accessed: 11 February 2023).

Whitley, R. (2000) The intellectual and social organization of the sciences. 2nd edn. Oxford: Oxford University Press.

Thematic Field B:

Digitalization of Society, Society and AI

Destabilizing Auditing: Auditing artificial intelligence as care-ful socio-analogue/digital relation

Cheshta Arora[1], Debarun Sarkar[2]

[1]Independent Researcher, Norway

[2]Independent Researcher, India

Abstract. The paper aims to highlight the emerging figure of the 'expert auditor' in the field of AI ethics that seeks to legitimize artificial intelligence through a technocratic solution. The paper builds on de la Bellacasa's nonnormative notion of 'care as a provocation' to speculate what careful AI auditing could look like and in what ways it can allow us to destabilise normative AI auditing practices. By going back to the etymological root of 'to audit' to the Latin audio, i.e., to listen to, to pay attention to, we argue for a notion of auditing that's a narrow checklist solutionist notion of auditing artificial intelligence.

1 Introduction

An open letter published in early 2023 following the release of GPT-4 which demanded a pause to giant AI experiments quoted Asilomar AI Principles (*Future of Life Institute*, 2017) to suggest that "advanced AI could represent a profound change in the history of life on Earth, and should be planned for and managed with commensurate care and resources"(Russell et al., 2023)*.* The authors of the open letter went on to point out that "[u]nfortunately, this level of *planning and management* is not happening, even though recent months have seen AI labs locked in an out-of-control race to develop and deploy ever more powerful digital minds that no one – not even their creators – can understand, predict, or reliably control" (Russell et al., 2023) (emphasis added). With this open letter, the threat of AI (embodied in GPT-4) and its management blew up in the popular discourse. The authors called "on all AI labs to immediately pause for at least 6 months the training of AI systems more powerful than GPT-4" (Russell et al., 2023).

Such concerns vis-à-vis AI auditing and governance have been proliferating over the last decade. Given the series of high-profile cases that popularised AI harms and injustices and the advent of audit culture post-70s (Strathern, 2003), one can say that there is an established liberal consensus around the need to build robust auditing processes and

practices to govern AI. What is debatable, nonetheless, is the nature of these processes i.e., what is to be audited, by whom, how, and when. The open letter thus emerges within this context. What is crucial however is the phrase "commensurate care" and the discursive function that it plays.

The phrase follows the conditional phrase: "could represent" which evokes the uncertainty of AI's future on earth, a bane or a boon, depending on how we proceed. In that sense, the phrase "commensurate care" could imply a warning, a caution, or an appeal to slow down in the face of imminent danger.

To care, however, is anything but straightforward. It raises a series of questions that can reformulate the very nature of the world and our relationship with it. However, before we move on and away from the letter, it is important to ask what are we being asked to care for? The following part of the letter offers a hint:

> "*Should* we develop nonhuman minds that might eventually outnumber, outsmart, obsolete and replace us? *Should we risk loss of control of our civilization? Such decisions must not be delegated to unelected tech leaders.* Powerful AI systems should be developed only *once we are confident that their effects will be positive and their risks will be manageable.*" (Russell et al., 2023) (emphasis added)

The above quote is rife with meaning. We, however, focus on three key temporal moments that serve the rhetorical structure of the above paragraph:

> *An imminent future*: "*Should* we risk loss of control of our civilization?"
>
> *The unfortunate present*: "Such decisions must not be delegated to unelected tech leaders".
>
> *A future that can be*: "*AI systems should be developed only once we are confident that their effects will be positive and their risks will be manageable.*"

Or to put it differently, the paragraph begins with a rhetorical strategy that pivots on blatant anthropocentricism ("our civilization"), a 'we' premised upon an empty ideal of 'democracy' strengthened by a sly reference to big tech organisation leaders ("unelected tech leaders"), and hope for restored status-quo, a happy ending implicit in the projected vision of the world where "effects will be positive" and "their risks will be manageable." Thus, the letter is merely asking us to care for the existing status quo: the man at the centre of the world, worlding a world of manageable risks, and its subdued others—the animal, the machine, and other abject affiliates.

It can be said that concerns vis-à-vis auditing have remained at the level of governance and management, of mitigating risks and harms. Auditing culture, or the culture of management and accountability, that pervaded the workplace, public institutions and academic from the 1980s onwards had come under anthropological scrutiny only in the

2000s (Strathern, 2003). The debate pivoted around creativity vs. responsibility, drawing attention "to the inability of the audit culture to recognize experimentations in creativity in writing, research and teaching" (Ananta Giri, 2003: 179) and examining the political, social and cultural consequences of auditing practices. It brought to light the valuation of skills, bodies, objects, and behaviour inherent in the quantifying gestures of the culture of auditing.

A similar kind of anthropological scrutiny which asks if we should audit AI or what would a democratic, and transparent auditing of AI look like, however, is still lacking. The reasons for this, from a critical point of view, are *at least* twofold and depend on how AI is being perceived: 1) For those who see AI as just another tool deployed to intensify quantification of the world and existing social relations, auditing AI offers one way to resist this quantification. 2) For those who perceive AI as an emergent threat that can either "eventually outnumber, outsmart, obsolete and replace us," auditing AI becomes a necessary recourse to tame this threat. Thus, both these positions vis-à-vis AI, i.e., the one that is critical of its quantifying gestures and ensuing harms and injustice, as well as the one that perceives AI as a threat, are in favour of establishing robust AI auditing mechanisms. A third position, that raises an important question of response-ability and perceives AI as an actor that allows us to reiterate the ethico-political question "who is and what is not considered to be a subject of rights and obligations" (Gunkel 2022), allows certain critical distance vis-à-vis AI auditing and clears the theoretical space for two questions:

- In the spirit of pursuing an egalitarian, democratic ideal, can auditing be more than merely managing risks?
- In the name of AI auditing and ethics, what are we being asked to care for?

Building a chain of interdependent intellectual debts, Henry & Oliver (2022) learn from de Bellacasa (who borrows from and reinterprets Tronto's political theory on the ethics of care) to deploy care as a provocation rather than a moral stance or invocation for motherly love. Asking "how distribution of power, privilege and resources lead to inadequate care in society", Henry et al via Bellacasa ask not only questions of "'For whom?" but also "Who cares?" "What for?" "Why do 'we' care?" and mostly "How to care?"'(Puig de la Bellacasa (2017) in Henry & Oliver (2022). We use Bellacasa's nonnormative notion of 'care as a provocation', to speculate what careful AI auditing could look like and in what ways it can allow us to destabilise normative AI auditing practices.

The introduction is followed by four sections. The second and third sections tease out the normative assumptions underpinning the discourse of AI auditing and ethics. The fourth section develops a notion of auditing as 'careful-analog/digital-relation'. The paper

concludes with a destabilised notion of AI auditing that disassociates it from the concerns of governance and management towards an ethico-political relation with the world.

2 AI Auditing and AI ethics: The problem of toolkits, guidelines, and checklists

The "gold rush" (Ayling and Chapman, 2022) in the field of artificial intelligence has been accompanied by a similar "gold rush" in the field of AI ethics. The unintended consequences, potential misuse of predictive systems, and the representative and socio-cultural biases reflected in the design of data-driven innovations fuelled the debate on AI ethics in the last few years. Today, the field has been divided into three phases: the first phase (2016-2019) operating in the applied ethics mode, resulted in a series of high-level principles, operationalized in the form of ethical statements and checklists, to ensure ethical, trustworthy, and responsible AI (Jobin et al., 2019). These principles and guidelines were issued by a range of actors but the research institutions played a primary role[10] with some involvement from the private and public sectors (Jobin et al., 2019) resulting in the emergence of an industry around AI ethics (Ayling and Chapman, 2022). The AI Ethics Guidelines Global Inventory maintained by AlgorithmWatch lists 167 guidelines published till 2020. They note, that only a handful of guidelines advocated for an oversight or enforcement mechanism (*AI Ethics Guidelines Global Inventory*, 2020). Via an analysis of 87 AI guidelines, Jobin (2019) identifies 11 ethical principles of transparency, justice and fairness, non-maleficence responsibility, privacy, beneficence, freedom and autonomy, trust, sustainability, dignity, and solidarity while noting a "substantive divergences among all 11 ethical principles in relation to four major factors: (1) how ethical principles are interpreted; (2) why they are deemed important; (3) what issue, domain or actors they pertain to; and (4) how they should be implemented" (Jobin et al., 2019).

The second phase witnessed "a more technical" shift with greater involvement from the computer science community "focussing on fairness, accountability, and transparency as an engineering 'ethical-by-design' problem-solving exercise" (Ayling and Chapman, 2022). This phase led to the development of computational definitions of ethical principles such as fairness and bias which contributed to a series of toolkits for detecting and mitigating algorithmic bias[11]. These toolkits, however, were quickly criticized for being

---

[10] See Algorithm Watch's project AI Ethics Guidelines Global Inventory (https://inventory.algorithmwatch.org/)
[11] See AI Fairness 360, Fairlearn etc.

reductive and pivoting upon a certain fantasy of 'technical fixes' to social problems (Lee et al., 2021) which brought to light the need for interdisciplinary approaches to AI ethics.

From the dataset of 169 guidelines, Ayling and Chapman (2022) identified 39 AI auditing or impact assessment tools. One of the notable findings reported by their analysis points towards the limited group of stakeholders using the tool. The tools/toolkits developed during this phase were "clustered around the product development phase of AI (developers, delivery, quality assurance), with the output from the tools (reporting) being used by management Decision-Makers" (Ayling & Chapman, 2022) as well as "little participation in the assessment or audit process by certain stakeholder groups (Voiceless, Vested Interests and Users) who are not included in the process of applying the tools or interacting with the outputs as tools for transparency or decision-making" (Ayling & Chapman, 2022). A thematic shift was already reflected in their analysis as they posed the rhetorical question in the title of the paper, "Putting AI ethics to work: are the tools fit for purpose"? to argue for a range of auditing techniques that can incorporate more long-range and democratic principles of "participation process, baseline study, life-cycle assessment, change measurement or expert committees" (Ayling & Chapman, 2022).

Not surprisingly, the third and current phase has moved to the 'how' question focusing on "governance, mechanisms, regulation, impact assessment, auditing tools, and standards leading to the ability to assure and ultimately, insure AI systems" (Ayling & Chapman, 2022). Where the second phase emphasized self-regulation, on "organisation or profession marking its own homework" (Raab, 2020) there is an emerging consensus developing in the third phase vis-à-vis third, party expert auditing that is premised upon the conceptualizing of "ethics as a service" (Morley et al., 2021). This consensus is premised upon two assumptions: 1) an ethical evaluation requires "a lot of relevant and reliable information and quite a good management" of choices, responsibilities and moral evaluations (Floridi, 2017), 2) Auditing as facilitation wherein publicly available documentation can facilitate participation process.

3 AI as a social-technical system, auditing as a socio-technical practice

The three phases identified in the literature complement each other in producing a notion of AI as a socio-technical system and of auditing as a socio-technical practice. Where the first phase asked the 'what' question, the second phase, in asking the 'how' question, produced and legitimized auditable artefacts that can explain how decisions were arrived at, or systems and processes were implemented (Ayling and Chapman, 2022; Jobin et al., 2019; Morley et al., 2021). The third phase is working towards consolidating the first

two phases via a figure of a (human) expert that can comprehend AI as a socio-technical system and engage AI ethics as a socio-technical practice (von Eschenbach, 2021).

A notion of AI as a socio-technical system emerged in response to the reductive and technical fixes predominating the first and second phases. Opposing these technical fixes, the relevance of social scientific approaches and theories to understand algorithmic harms and injustice quickly brought to the centre the sociotechnical dimensions of AI. This third phase has worked towards shifting the focus away from the siloed visions of the technical to a more relational approach that insists on the co-constitutive nature of objects, bodies, processes, tools and relations (Birhane, 2021). A socio-technical approach decentred the anthropocentrism of a property-based normative ethical approach to insist upon the ontological primacy of relations. In a relational view, properties of an object—such as human, animal, or technological—emerge in relation rather than a priori. The increased stress on AI as a sociotechnical system has however not been able to bypass, remove or radically question the role of the expert in the sociotechnical system particularly in the discourse of auditing AI (Arora and Sarkar, 2023).

The relational approach opened the field of ethics to the ethico-political question of response-ability in the face of the other—the animal, the machine, the bot. The field of robot ethics that concerns itself with the problem of robots as moral agents served as a fertile ground to interrogate the limits of normative ethics and foreground the leaky nature of these categories—human, machine, animal—and the subsequent boundary work that goes into stabilising these categories.

As the debate shifted away from the "principled and the technical, to practical mechanisms for rectifying power imbalances" (Ayling and Chapman, 2022), AI as a sociotechnical system became a catchphrase for both relational as well as normative ethical approaches albeit with very different connotations. Where the relational ethicists insist on the socio-technical aspect of AI to foreground emergent relations that are deeply contextual, the normative ethical approaches describe AI ethics as the sociotechnical to foreground the part-whole problematic to argue that, "AI is *only part* of the decision-making process" (von Eschenbach, 2021). This allows von Eschenbach (2021) to argue not only that "If we are justified in trusting the socio-technical system, of which AI is a part, then we can still use AI for high-stake decisions because AI is not the sole decision-maker" but also foreground the figure of an expert as an inevitable part of the socio-technical system since for "most of us, our trust in AI will be mediated through our trust in the experts and their testimony about the trustworthiness of these technologies".

These two divergent use cases of the catchphrase 'AI as socio-technical systems' lead to two different ethico-political visions of auditing. Whereas for normative ethicists, the introduction of an expert auditor signals the return of the 'human-in-the-loop', for

relational approaches the expert auditor signals the foreclosure of ethico-political possibilities that were emergent in this encounter between the human and the machine. Moreover, for the normative ethicists, the political hope remains in the assumption that an auditor will play the role of a (trustworthy) facilitator who will act as a rational, political conscience of the society and uphold the democratic principle, whereas, for the relational ethicist, the figure of an expert auditor betrays the democratic principle and signals the return of governmentality and strict ordering of bodies and relations.

4 Auditing as 'careful-socio-analog/digital-relation'

As mentioned previously, the third phase of AI ethics is coalescing around a notion of auditing that is premised upon a notion of AI as a socio-technical system. While there's still confusion vis-à-vis what different actors mean by auditing wherein processes such as impact assessment, risk management, and audit are all used interchangeably under a broader category of auditing (Carrier and Brown, 2021). However, it is clear that the meaning of AI auditing is being stabilised by envisioning an entire ecosystem of processes that will be implemented at multiple scales – of team, organization, industry and state and will include technical practices (of maintaining audit trails, SE workflows, verification and bias testing, explainable UI), management strategies (leadership commitment, training, internal reviews, industry standards), and external reviews (independent oversight, government regulation, auditing firms, insurance companies, NGOs & civil society, professional organizations) (Shneiderman, 2020). The ecosystem will give way to new process, best practices, legal and regulatory regimes, and experts who mediate between different scales, processes, and practices. As has been the experience with auditing practices in other industries such as finance, environment etc, it is quite possible that the ecosystem will be operationalized through an investment in, what Power (1997) had called, "shallow rituals of verification", "a form of learned ignorance", which is promoted "at the expense of other forms of organizational intelligence" (1997: 123). The open letter and how it imagines risk, uncertainty and control underscores "the programmatic faith in auditing" which is a symptom of "wider social anxieties and a need to create images of control in the face of risk" (1997: 121). At the same time, given the need for stability, the ethical quality of 'trustworthiness' is paramount in this ecosystem whose success depends on interdependent trust between teams, management, organization, government, citizens and auditing experts (von Eschenbach, 2021).

However, it is worthwhile to destabilise this vision of auditing by foregrounding other ethico-political relations emergent in this encounter with the machine, "a kind of external

threat proceeding from the future" that foregrounds the limits of the present (Gunkel, 2022). We believe the field of AI ethics can gain through such endeavours wherein auditing visions are critically destabilized (and disassociated from the normative vision of governance and regulations) when refracted through other ethico-political relations. In this paper, we focus on de Bellcasa's provocation of 'care' to foreground auditing as a 'careful socio-digital/analog' relation.

To suggest that the signifier and the notion of 'care' has been abused in the past few years as a commonsensical liberal (feminist) ethics would not be an exaggeration. To that extent, even the advocates of the predominant 'auditing as governance' approach will not be averse to a liberal notion of 'care' that is premised upon a "liberal vision of a subject as a moral agent" (Braidotti, 2006: 119) that is involved in "the static contemplation of the perpetuation of the regime of the Same" (Braidotti, 2006: 123). This vision of a subject is destabilized when the self-identifying moral agent is face to face with the provocative questions of care—"Who cares?" "What for?" "Why do 'we' care?" and mostly "How to care?"'(Puig de la Bellacasa, 2017). While today we more or less agree that we care for the socio-technical systems, to ask further what for, why do 'we' care and how is to point towards the limits of the top-down liberal vision that cannot answer "why should people care? How can one make them care? And what do we do with those who do not care at all?" (Braidotti, 2006: 119)—questions that point towards the vertical ordering of bodies and relations. To ask, 'how to care?' is first and foremost a political commitment. The reworking of the notion of 'care' into an analytics or provocation – where "'how to care?' is insistent but not easily answerable" (Puig de la Bellacasa, 2017: 7) – points to how the "ethics" in an ethics of care cannot be about a realm of normative moral obligations but rather about thick, impure, involvement in a world. It is not invested in maintaining the word as it is but asking what it could be.

Thus, to think of auditing as a 'careful relation' then would be to brace 'ethical vertigo', (Braidotti, 2006: 123) where we confront complex ethical dilemmas. It is in this light that it remains exigent to highlight the tension of analogue/digital wherein a processual fuzzy world is translated into a binary logic of good and bad. The discourse of auditing AI, if it takes the premise of socio-technical systems seriously, would need to acknowledge the always-shifting terrain of auditing and what is considered morally good and bad.

5. Conclusion: Destabilising AI auditing

While thinking AI often invokes both tech optimism and tech pessimism, we want to remain open to the novelty of this particular reconfiguration of social relations. If we agree with the basic premise that there is something qualitatively new that the current (and

future) generation of AI does to our relationships with the world around us then it remains exigent to retain a possibility of an encounter with the unknown.

To destabilise auditing necessitates interrogating its current preoccupation with notions such as truth, mediating through an expert and commonsensical evocation of principles like transparency, fairness, bias etc. Etymologically 'to audit' traces itself back to Latin *audio* i.e., to hear, to pay attention to, to attend to. This etymological notion of auditing is lost today amidst a checklist notion of auditing wherein auditing is seen as a mere process for accountability. While problems of stakeholder participation[12] have been raised by certain authors, auditing AI is slowly but surely emerging as a new profession (Phan et al., 2022) which to echo Preitl (2021) seeks to "preserve power". By introducing the figure of the expert auditor[13] normative AI ethics aims to make us care for AI at the expense of egalitarianism. It is crucial to highlight this foreclosure of the political in AI ethics. By inculcating a regime of regulation and governance normative AI ethics forecloses AI as a site of the political.

If we hold on to the etymological meaning of 'to audit', auditing wouldn't resemble current notions, images and practices of auditing as a straightforward, to-the-book normative process. To hear, pay attention to, to attend to, necessitates an open-ended approach to not just AI assemblages but also auditing assemblages. Auditing in such a case would evoke allied notions of research, investigation, being a detective, being curious and more than anything, exploring. Anyone could do that, fail, mess it up, or provide contradictory analyses. Such a notion of auditing would be open to AI assemblages and their cultures of care i.e., it would be open to the range of questions that de la Bellacasa raises. It very well might not resemble auditing anymore in its contemporary sense but would certainly attend to, pay attention to and hear AI assemblages.

Funding Disclosure

---

[12] This is not a place to rehearse this argument but the notion of stakeholder inclusion risks repeating consensus-based models of governance where there is no place for dissensus (Hillier, 2003).

[13] As Arora and Sarkar (2023) note, there remains something to be said about the tendency to foreclose discussions on propriety AI systems which remains at the heart of discussion on AI ethics.

References

AI Ethics Guidelines Global Inventory (2020) About. Available at:
https://inventory.algorithmwatch.org/about (accessed 3 May 2023).

Ananta Giri (ed.) (2003) Audited accountability and the imperative of responsibility
Beyond the primacy of the political. In: Audit Cultures: Anthropological Studies in
Accountability, Ethics and the Academy. Routledge.

Arora C and Sarkar D (2023) Auditing Artificial Intelligence as a New Layer of
Mediation: Introduction of a new black box to address another black box.
Hipertext.net (26). 26: 65–68.

Ayling J and Chapman A (2022) Putting AI ethics to work: are the tools fit for purpose?
AI and Ethics 2.

Birhane A (2021) Algorithmic injustice: a relational ethics approach. Patterns 2(2):
100205.

Braidotti R (2006) Transpositions: On Nomadic Ethics. Cambridge, UK ; Malden, MA:
Polity Press.

Carrier R and Brown S (2021) Taxonomy: AI Audit, Assurance, and Assessment. For
Humanity. Available at: https://forhumanity.center/web/wp-
content/uploads/2021/09/ForHumanity.center_Taxonomy_AI_Audit_Assurance_A
ssessment.pdf.

Floridi L (2017) Why Information Matters. The New Atlantis (51): 7–16.

Future of Life Institute (2017) AI Principles. Available at: https://futureoflife.org/open-
letter/ai-principles/ (accessed 3 May 2023).

Gunkel D (2022) The Symptom of Ethics; Rethinking Ethics in the Face of the Machine.
Human-Machine Communication 4: 67–83.

Henry JV and Oliver M (2022) Who Will Watch the Watchmen? The Ethico-political
Arrangements of Algorithmic Proctoring for Academic Integrity. Postdigital Science
and Education 4(2): 330–353.

Hillier J (2003) `Agon'izing Over Consensus: Why Habermasian Ideals cannot be
`Real'. Planning Theory 2(1): 37–59.

Jobin A, Ienca M and Vayena E (2019) The global landscape of AI ethics guidelines.
Nature Machine Intelligence 1(9). 9. Nature Publishing Group: 389–399.

Lee M, Floridi L and Singh J (2021) Formalising trade-offs beyond algorithmic fairness:
lessons from ethical philosophy and welfare economics. AI and Ethics 1.

Morley J, Elhalal A, Garcia F, et al. (2021) Ethics as a Service: A Pragmatic Operationalisation of AI Ethics. Minds and Machines 31(2): 239–256.

Phan T, Goldfein J, Kuch D, et al. (2022) Introduction: Economies of Virtue. In: Phan T, Goldfein J, Kuch D, et al. (eds) Economics of Virtue – The Circulation of 'Ethics" in AI. Amsterdam: Institute of Network Cultures, pp. 6–22. Available at: https://networkcultures.org/wp-content/uploads/2022/12/EconomiesofVirtueINC2022TOD46-2.pdf.

Power M (1997) The Audit Society: Rituals of Verification. Oxford University Press.

Prietl B (2021) Why Ethics Norms are Not Enough, or: How Current Critique of Digital Data Technologies Preserves Power. In: Conference Proceedings of the STS Conference Graz 2021 (eds Cole, Nicki Lisa, Jahrbacher, Michaela, and Getzinger, Günter), 2021. Verlag der Technischen Universität Graz. Available at: https://diglib.tugraz.at/download.php?id=6188f5d25fb1b&location=datacite (accessed 4 May 2023).

Puig de la Bellacasa M (2017) Matters of Care: Speculative Ethics in More than Human Worlds. Posthumanities 41. Minneapolis: University of Minnesota Press.

Raab CD (2020) Information privacy, impact assessment, and the place of ethics∗. Computer Law & Security Review 37: 105404.

Russell S, Bengio Y, Marcus G, et al. (2023) Pause Giant AI Experiments: An Open Letter. In: Future of Life Institute. Available at: https://futureoflife.org/open-letter/pause-giant-ai-experiments/ (accessed 3 May 2023).

Shneiderman B (2020) Bridging the Gap Between Ethics and Practice: Guidelines for Reliable, Safe, and Trustworthy Human-centered AI Systems. ACM Transactions on Interactive Intelligent Systems 10(4): 1–31.

Strathern M (2003) Audit Cultures: Anthropological Studies in Accountability, Ethics and the Academy. Routledge.

von Eschenbach WJ (2021) Transparency and the Black Box Problem: Why We Do Not Trust AI. Philosophy & Technology 34(4): 1607–1622.

A Cross-Platform Study of the Sneaker Reselling Market

R. V. Boboc[1], R. Baciu[2]

[1] National University of Political Studies and Public Administration, Romania

[2] Independent researcher, Romania

Abstract. Living in a platform society (van Dijck, Poell and de Waal, 2018) makes for a myriad of consequences at societal level, as well as core modifications to industries and markets. As plenty of industries are being redefined through the internet and a lot of markets become platformized, we can witness a wide array of specificities characterizing this process - be it due to local particularities or due to industry communities - which often go under-researched. The Romanian-based sneaker reselling market is an instance of a wider platformized industry, globally valued at around $6 billion. What makes this case study particularly different is how the sneaker resale industry divides a digital platform architecture (Dolata and Schrape, 2022) into where the financial activity happens - such as StockX, versus where market value is being negotiated within a heavily gatekept industry community located on Discord.

1 Introduction

Valued at around $6 billion, the sneaker resale market has seen an increased interest in recent years with sneakers becoming an alternative asset (Steinberg, 2018; Kernan et al., 2020). Being a sneaker collector is no longer reserved just for enthusiasts, but has rather become a full-fledged area of investment. This paper delves into a particular set of dynamics happening on the platformized sneaker reselling industry in a Romanian-based secondary market. Being a cross-platform research, it has salient implications into how the market is shaped by the interplay happening between two key platforms - StockX and Discord. StockX is a consumption-oriented e-commerce marketplace widely used for buying and selling sneakers and other apparel; Discord is an instant-messaging social platform that allows communities to be created on different servers, conceptualized in our research as a communication-oriented platform. This paper focuses on how the interaction between the users of one of the most popular Romanian reselling Discord servers generates particular perceived market dynamics on StockX within the emerging platformized industry of sneaker reselling.

We place our contribution within the larger fields of platform, as well as science and technology studies. There is an extensive body of work on the socio-technological alterations caused by digital platforms within mature information societies (Floridi, 2016). Plenty of processes are being interrogated by key research, such as platform regulation (Gillespie, 2010, 2016; Morozov, 2013; Gorwa, 2019; van Dijck, Nieborg and Poell, 2019), platform capitalism (Srnicek, 2016, 2018, 2020), surveillance capitalism (Zuboff, 2019) and platform economies (Kenney and Zysman, 2016; Nieborg and Helmond, 2019). Scholars also define various intricacies resulted by platform companies' interference with everyday activities and systems, defining phenomena such as the platformization of infrastructures (Helmond, 2015; Plantin *et al.*, 2018), of industries (van Dijck, Poell and de Waal, 2018), or the infrastructuralization of platforms (Kitchin, 2014; Plantin *et al.*, 2018). This entire body of knowledge seeks to pinpoint how societies negotiate and regulate their activities in a platform-dominant ecosystem. The current paper takes all of these implications, but targets a smaller-scale example - not to refute, but to showcase an under-researched set of platform dynamics.

One of the main objects of our research is a particular invite-only, paid subscription Discord sneaker reselling group, based in Romania. There are around 100 members, making it the largest in the country. The server is organized in multiple channels with specific purposes - from community-oriented spaces, to ones dedicated to website monitoring. On the other hand, StockX has affordances that enable certain behaviors which feed into the tensions of a market built upon artificial scarcity of products. The intricacies of both the sneaker market and sneaker resale platforms go beyond simply the economic value – the issue at hand is not only a discrepancy between supply and demand, but rather that the construction of value becomes economic, cultural and technological.

Consequently, we propose an analysis of a cross-platform process of how a niche market (per)forms as, and through a complex ecosystem of infrastructural means and participatory community action. We are tackling a platformized industry and its adjacent economy with our case study on the Romanian resale market. By engaging in a platform-sensitive (Bucher and Helmond, 2018), cross-platform approach (Rogers, 2018) we are able to investigate distinctive user subcultures and their shifting role as complementors (van Dijck, Poell and de Waal, 2018; Poell, Nieborg and Duffy, 2022). Thus, we reveal a wide array of specificities characterizing the platformization of markets, with close attention to the local particularities and the large-scale influence of industry communities.

The sneaker resale secondary market offers plenty of insights into how digital platforms create and regulate the infrastructure for consumption purposes. But what makes this market different is how the sneaker resale industry divides a digital platform architecture (Dolata and Schrape, 2022) into where the financial activity happens versus where it is

being shaped by internet-based communities. Thus, while products are being sold on one platform, industry communities located on a different platform actively negotiate and shape market dynamics.

As the paper uses a cross-platform methodology, we propose various digital tools to navigate platform specificities. Therefore, the platform company StockX, defined by its organizational core (Dolata and Schrape, 2022), is investigated using the walkthrough method (Light, Burgess and Duguay, 2016) to lay bare the main platform affordances (Davis and Chouinard, 2016; Bucher and Helmond, 2018). Because the social action space of StockX takes place on a communication platform, we present a separate methodology to inquire into a Romanian Discord server for sneaker reselling. We are interested in how its affordances and possibilities of action are perceived by the group members and we aim to engage with the community by employing a combination of netnography (Kozinets, 2019) with interviews of members who make use of StockX. Taken together, these elements showcase how the dynamics of a platformized market are shaped on a communication platform inhabited by a local community. Therefore, this cross-platform study helps uncover the fluid and heavily-negotiated relationship between platform operators and participants and how the regulatory and economic power potentials are a result of constant cross-platform activity interplay. Furthermore, this methodology is informative for alternative STS socio-cultural studies on internet niche communities.

2 Theoretical Framework

Within the backdrop of the extensive knowledge production on the general platformization of industries and architecture of platforms, this paper seeks to showcase how a smaller-scale case study challenges or extends some of the main arguments of the fields. The aim of the paper is to illustrate how a cross-platform approach (Rogers, 2018) is instructive in establishing the relationship between the technicality and sociality of platforms, and to showcase how users navigate among their cross-platform roles. While platform theory (van Dijck, Poell and de Waal, 2018) offers useful insights into how platforms operate, and descriptions of platform architecture (Dolata, 2022; Dolata and Schrape, 2022, 2023) offer more in-depth accounts on the relationships that platforms afford, we argue that inside this ecosystem, there are smaller-scale examples of multiple platforms that operate relationally by means of how users utilize them. Consequently, we argue that such operationalization entails several technical, communicational as well as economic consequences for entire sectors or industries.

The paper starts with one key assumption, namely that platform dynamics can only occur as a relational phenomenon between two parts. First, we have technology in the form of data structures, algorithms, and interfaces. Second, there are user practices developed by individuals, as well as corporations, state institutions, and societal organizations. As we shall see throughout the entire paper, these dynamics are industry dependent and in a state of ever-changing negotiation. Taken together, we conclude that infrastructural elements and business models of platforms converge with user practices of complementors and regulators in an in-depth understanding of how a 'platform society' (van Dijck, Poell and de Waal, 2018) performs.

In order to investigate platform infrastructures as well as user practices, this paper departs from a particular framing of platform architectures (Dolata, 2022; Dolata and Schrape, 2022, 2023). Although we abide by the conceptualization of the platform as organizing core and social action space, our research proposes a slight modification. We argue that there are industries where we must look at platforms as being part of a relational ecosystem. In our case, this ecosystem consists of one consumption-oriented market space infrastructure - StockX, and a communication-oriented community platform - Discord, acting together to organize and regulate the market. Only together they can set rules, impose control systems, coordinate and monitor action, thus acting on both technical and social levels (Dolata, 2022). This cross-platform approach is a highly intentional strategy that permits taking each platform's qualities and specificities and repurposing them into more accurate social and cultural research (Rogers, 2018, pp. 99–100). This allows for an insightful analysis of the entire socio-technical environment, laying bare the way in which market practices are being created and deployed by the users who fluctuate between complementor and participant roles.

In order to tackle the topic of a platformized market, we must also conceptualize the notions embedded in this particular line of thought. The notion of platformization is understood here as "the penetration of the infrastructures, economic processes, and governmental frameworks of platforms in different economic sectors" (Poell, Nieborg and Van Dijck, 2019, p. 5). That is to say, each platformized sector poses its particular specificities. In the case of the amplification of an entire secondary market, we are presented with the relational ecosystem by means of the cross-platform approach. Namely, platformization allows for a fast-paced and facile close-group negotiation on the market value of various (ranges of) products in real time via the communication-oriented platform; consequently, those practices are employed on the market infrastructure platform, creating a full-fledged market value de/valorization process. This is also further afforded by a gray zone in terms of regulation, thus resulting into a volatile market.

However, platforms are more than mediators providing infrastructural support for activities or markets. They produce their own platform economy, which comes with questions echoing both societal and economic implications. These refer directly to the creation and capture of value, the ownership and effective control of the platform and the potentially radical ways in which work is valued and understood (Kenney and Zysman, 2016, p. 66). We contend that each industry presents its own specificities and its own market dynamics. Hence, a cross-platform approach can extend the scope of such interrogations and provide a deeper understanding of the underlying relationship between the technology and heavily negotiated user practices.

The platform studies approach of the users in the context of a cross-platform analysis generates a particular view upon them that we must address. Before we do, we must emphasize the underlying commercial logic of any platform that results in various business models (van Dijck, Poell and de Waal, 2018, pp. 38–39). These businesses involve different users engaged in economic exchanges which are enabled by platforms; as such, the multisided market nature of platforms becomes a core characterization of the entire platform-mediated networks ecosystem (Evans and Schmalensee, 2016; McIntyre and Srinivasan, 2017). Therefore, the users present in this ecosystem become complementors, defined as "organizations or individuals that provide products or services to end users through platforms" (van Dijck, Poell and de Waal, 2018, p. 17). That is to say, users navigate the intricate platform ecosystem with a mutually beneficial strategy in mind - to produce value for themselves, in turn producing value to the platform company as well.

As a result, users understood as complementors in this ecosystem navigate various platform-informed business models. According to Poell, Nieborg and Duffy, complementors need to "to align their business models and work with the economic framework set out by platform operators" (2022, p. 46) if they want to thrive within a platformized industry and partake in economic transactions. This can involve various means to navigate the competitive platform-mediated business environment, such as their own production, distribution or monetization means. Thus, the platform users need to develop complex strategies adapted to the platform markets they engage in. However, we must also take into account that platforms are not merely a sum of economic relationships, but they are also made up of "action-orienting social rules, institutional settings and social relations between a great variety of individual, corporate and collective actors" (Dolata and Schrape, 2023, p. 4).

Complementors strategies are informed by both the platform business models and their technical interface. The latter can be observed at the level of platform affordances. These can be understood as properties of the medium that allow or restrain the action of the users. Following Bucher and Helmond (2018), platforms afford different possibilities of

action depending on the type of user they host, which is why a platform-sensitive approach allows for the highest degree of meaningful investigation. Moreover, this approach also underlines the relational aspect of affordances, as platforms are not only defined by their infrastructure and business models, but also by the socio-technological environment they orchestrate. In other words, through affordances, "artifacts request, demand, allow, encourage, discourage, and refuse" (Davis and Chouinard, 2016, p. 2). When investigated with attention to platform sensitivity, these mechanisms become key to understanding the relationship between how a platform is intended to be used and how the user makes sense of that medium.

Both the relationality and affordance mechanisms are even more apparent in a cross-platform approach. As we shall see, the business strategies nudged by the platform's interface and business model of StockX are manufactured and negotiated by a specific industry community that makes use of Discord's communication affordances. Therefore, these affordance mechanisms are informative of how the interface nudges the user to navigate it (Yeung, 2017), but also instructive in decoding how market dynamics are being negotiated in a cross-platform context.

While the interface can be analyzed using the critical analysis of the walkthrough method (Light, Burgess and Duguay, 2016), decoding users' communication practices enabled by communication affordances needs input from the community itself. This can be achieved both through nethography (Kozinets, 2019, 2021), as well as through engaging the community members directly. The reason for this multisided community analysis is to understand not just what dynamics platforms afford, but also how they interpret those affordances. This sort of phenomenon is discussed by Sophie Bishop (2019), who researches how algorithmic gossip becomes a valuable resource for content creators, as it reveals their perception of how algorithms work and how they can better strategize their content production plan accordingly. In the context of a secondary market based on speculating potential market value of items on Discord, this process of understanding how users make sense of their possibilities of action is instrumental in establishing how the users build their strategies. That is especially relevant, as the direct result of that strategy building is translated into business practices on StockX, which have consequences on the entire secondary market dynamics. Consequently, it is crucial to understand how this community of complementors assembles its platform navigation strategies based on perception of platform affordances and in-group market speculation.

3 Methodology

As a cross-platform analysis, the paper is organized in a twofold manner; as such, it requires a combination of methods in order to systematically tackle the relationship between the two platforms. It is important to first look at both platforms - StockX and Discord - as individual entities with their own particularities before delving into the relationship between them. This importance resides in the specificities of each platform, which tend to organize the behavior of their users according to the interest of the developers of these systems. However, especially in the case of Discord, due to its customizability, it allows for a wide range of activities; as a consequence, it becomes necessary to understand how the community in our study is organized on the technical and social levels.

The initial step of our analysis consists of applying the walkthrough method (Light, Burgess and Duguay, 2016) in the process of selling a pair of sneakers on StockX. It implies taking step-by-step notes of an app with the purpose of understanding how the app's governance and operating model influences the technological and cultural experiences of its users. The walkthrough method allows us to render visible the main platform affordances (Davis and Chouinard, 2016; Bucher and Helmond, 2018) and how these play a role in the decisions a sneaker reseller might make during this process.

Furthermore, as the social action space of StockX takes place on a communication platform, our attention is turned towards one of the most popular Romanian Discord servers for sneaker reselling. Here, we focus on a combination of two methods: first, we engage with netnography (Kozinets, 2019, 2021), to gain a generalized overview of such a community and how it is structured on multiple levels. We look at both the server itself and how it is structured, as well as the relationships between all levels of users (beginners, experienced, power users, and moderators), possible through direct access that one of the authors has to the server. Second, we employ interviews with community members. We made an announcement on the server asking for participants which have (1) at least 100 sales made in the last year on StockX and (2) at least seller level 4. We used these two characteristics to define StockX power users in the context of this particular Romanian Discord server. We conducted a total of 9 interviews, representing a sample size of approximately 10% of the group. These interviews offer direct insight into how the users perceive themselves and others in the entire sneaker reselling process, which is mediated by both Discord and StockX. Our aim is to showcase how this relationship is reflected at the level of industry-specific platforms (StockX, Discord) through technical and qualitative methods, with the purpose of gaining a deeper knowledge of how these mechanisms reflect on the social and economic relations of the Romanian sneaker resale market.

4 Findings & analysis

The first section is dedicated to the application of the walkthrough method on the process of selling sneakers on StockX. This is imperative to understanding the technical milieu in which the sneaker reselling market unfolds. There are specific patterns and nudges that StockX employs in order to direct user behavior. In our application of the walkthrough method, we will focus on the everyday use of the StockX app, as it renders these processes visible.

Further, we present a general overview on how the community is organized; in order to study the Discord group in a familiar environment we opted for participatory observation in the form of netnography. This allows us to gather day-to-day information and observe the unfolding of relationships and complex intricacies of the social milieu.

4.1 StockX and the Walkthrough Method

When a user decides to sell a pair of sneakers, the first thing they see on the product page are the Buy/Bid and Sell/Ask buttons (**Fig. 1**). These represent the two main actions that a user can perform at any given moment. For sellers, once they have selected the size, StockX offers detailed market information in the form of three main markers: Earn More, Sell Faster and Sell Now. By default, the Sell Now button is selected, nudging the user to sell the pair instantly, instead of placing an ask; this benefits StockX directly, generating instant revenue. The total amount of fees is hidden behind an unintuitive plus sign (**Fig. 2**), in an effort to discourage the user from accessing the page. As such, StockX is pushing towards a lack of patience in the market, encouraging users to sell their sneakers quickly. This is beneficial for StockX, but not for the resellers. Sometimes it is optimal to wait until the market stabilizes and impatient sellers exit the market; this ensures that there is a higher profit margin to be made for those willing to play the waiting game.
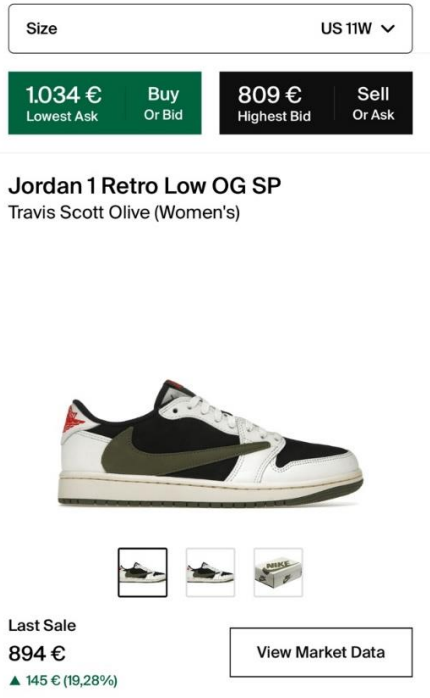
Figure 1: StockX app product page, showcasing the main Buy/Sell affordances.
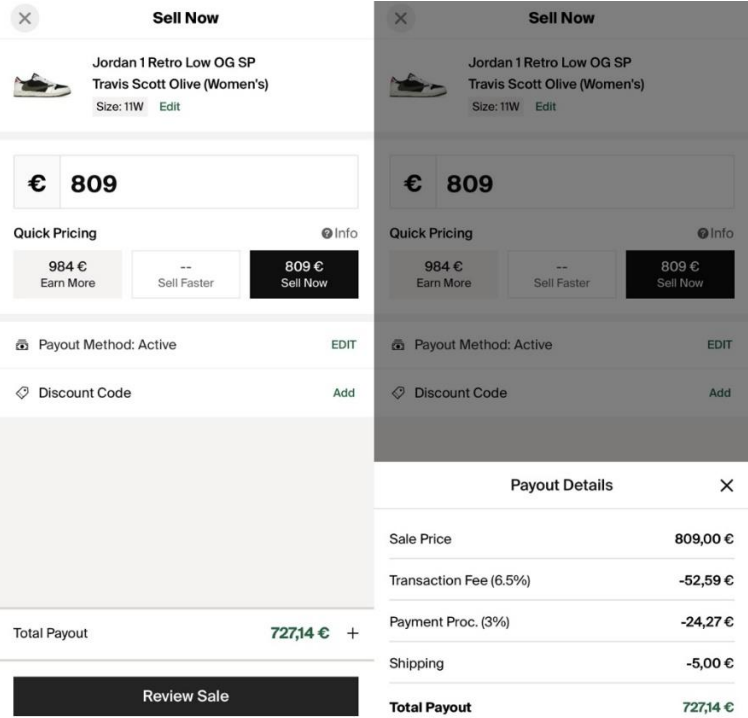
Figure 2: The left side showcases what users see after pressing the 'Sell' button. Only after pressing the plus sign, they can see the fees breakdown.

In order to further incentivize sellers to remain on the platform, StockX uses a loyalty program which has some perks. As the number of sales increases, the fee charged by StockX decreases. There are also other benefits, such as bulk shipping or access to a different interface for the higher seller levels. These levels are not permanent, but rather reset every quarter, keeping in line with the financial imagery. As such, sellers are guided specifically to impatient selling towards the end of the quarter in order to maintain or improve their seller level.

It should also be noted that the 'stock market' imagery is all-encompassing for StockX and their branding. By offering market data (price and date of sale) as well as other financially-derived components (**Fig. 3**), StockX is engaging in the commodification of data in a mutually beneficial way, by offering the users access to it, which ultimately keeps them using the platform. However, this ultimately benefits StockX, as the sneaker resale market is largely built on exclusivity and early access to trending pairs. Ultimately, StockX has a lot to gain financially from encouraging users to exit the market as soon as possible in order to cash in on their fees.
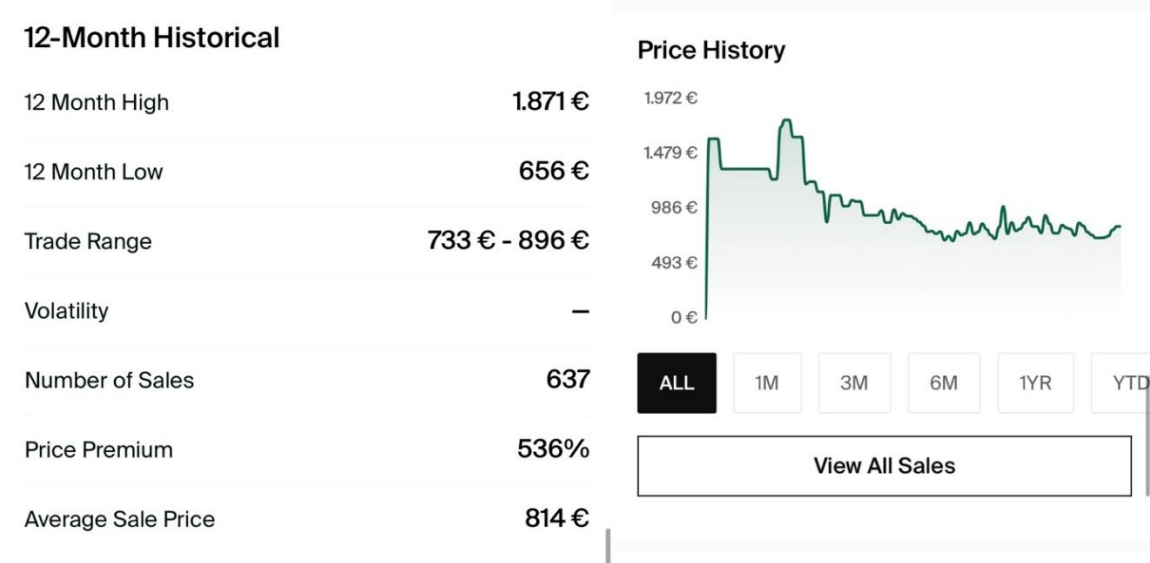
Figure 3: 12-month market data, price history and other financially-derived information provided by StockX on any product page.

4.2 Community Formation on Discord and Netnography

Discord sneaker resale groups usually come in the form of a paid subscription and/or are invite-only. These groups have dedicated channels where notifications are sent once a website adds new products. These notifications are based on scripts made by developers, which require a fairly in-depth understanding of programming, anti-bot security, e-commerce platforms, deobfuscation among others. Monitoring has become a

necessity due to the artificial scarcity of some sneakers, which means that the chances of purchasing limited-edition pairs are relatively slim if users don't have access to the right tools, hence to such communities. Thus, customizable automated methods of monitoring become one of the key perks of this group.

Being part of a sneaker reselling Discord group implies understanding a specific set of rules and in-group dynamics. Apart from explicit server rules which must be respected and which can usually be found in a dedicated channel, there are also rules regarding expected behaviors that can be inferred based on prolonged observation. Both of these sets of rules inform the group dynamics especially by generating hierarchies among users. There is an official hierarchy of members, structured according to Discord's affordances, which allows specific member roles. As such, the users are differentiated by their status: paying members, non-paying members (hand-picked members close to the administration team; this is a common practice inside sneaker reselling servers), moderators and administrators. The unofficial hierarchy places members in a different light: even though there is no distinction between the paying members, they are differentiated through other means - purchasing power, age in the server, time spent online communicating with others. Consequently, we identify that there are a number of 'power users', which we define as members who have been in the server for a long time, are close to the administration team, have a high purchasing capacity and are generally successful in sneaker reselling. These users are seen as trustworthy, sharing reliable and unique knowledge and are regarded highly by members.

The sense of community which characterizes the group is further strengthened by having both sneaker-related channels, as well as spaces dedicated to diverse interests (from cooking, to cars, music and other hobbies). This dynamic is enforced and regulated by community managers, who produce guidelines, moderate interaction, and have the ability to warn and mute users when they break the rules. We are, thus, presented with a strongly gatekept community with active rule enforcers.

Another key feature of this group is the required range knowledge. The literacy required to successfully participate in the server and be an active member of the community is manifested in different ways. The members are expected to be familiar with sneaker reselling slang and in-group references and jokes in order to be considered part of the community. Extensive participation throughout the day is also highly encouraged through the almost-constant flux of conversation inside the channels. It's also imperative that they can navigate Discord's affordances, the specificities of sneaker retailers' websites and the checkout processes, as well as bypassing different filters created by retailers to prevent reselling (creating multiple accounts with different names, using multiple addresses when purchasing pairs). Moreover, the members should have what we call a strong reselling competency - that means having a solid understanding of which

characteristics lead to sneakers becoming profitable. This can be either derived from past performance of certain models, profitability of specific colorways, knowing consumer trends or following celebrities and influencers.

4.3 In-depth Interviews

The interviews were conducted over Zoom, in Romanian, so that the users can express themselves freely. First, the users were asked what are the main advantages of being in the Discord server. An overwhelming majority appreciated being part of the community above all, whereas exclusive information and website monitoring came in secondary. They perceive the possibility of having questions answered in real time as a key aspect for participating inside the community. There is a strong sentiment of participation, which users value regardless if the quality of the service would decrease, i.e., if less information regarding profitable sneakers was provided.

Regardless of the strong sense of community, members do not necessarily use the information relayed in the server in order to gauge the profitability of a particular pair. For example, half of the participants agreed that some members of the group are rushing to sell their pairs, missing out on potentially maximizing their profit; this is tied in to the previously mentioned discussion regarding strong reselling competencies. This is also related to how users gauge the validity of information shared by others with regards to the profitability of certain models. The participants who are more experienced and have more funds available tend to trust their own knowledge, whereas users who have spent less time in the market usually rely on StockX.

The decision to purchase a pair once it appears in the website monitors is fairly complex and is focused on a multitude of sources (StockX, previous performance, own knowledge), showcasing a developed sense of literacy in the sneaker market. The responses were also fairly in favor of constantly making profit versus a riskier selling strategy based on selling higher-profit items from time to time. Members which value a higher-profit strategy are also the ones which employ a different approach - for example, one user sells designer sneakers, which are lower in volume, but render a higher return on investment.

For about half of the people interviewed, the decision to purchase a pair does not change at all based on who else is purchasing the pair. When there is a positive influence, it is related to the trustworthiness of the users purchasing it. There are also cases when a purchase is actively avoided, for example when people known as impatient sellers are involved. However, regardless of the community formation, it appears that people are either neutral towards the discussions inside the group, or largely prefer the 'raw data'

that StockX presents. This reinforces the imagery that StockX has created and people appreciate the available data.

The decision to sell on StockX is based on its ease of use and fast payments. It is considered a safe, reliable and trustworthy platform. When people do decide to sell on other platforms, the main alternative for StockX is Wethenew, a French sneaker reselling platform; when asked, the participants said that Wethenew sometimes offer better profit margins than StockX, and one underlined the possibility to consign pairs as a key difference.

Overall, what users appreciate most about StockX is the ability to maintain a steady cash flow. In this sense, StockX offers bulk shipping and early payout. The possibility to instantly sell pairs through the 'sell now' button is highly appreciated. The early payout affordance is one of the main reasons for choosing StockX over other platforms. Users argued that they do not have to worry about long payout times or missing out on potential sneaker releases due to not having money available. In line with this, more than half of the people interviewed declared that they are willing to sell pairs for a smaller profit to keep/increase their seller level. The reason for this is, in part, due to the fact that specific affordances (bulk selling, early payout) are tied to the seller level of an account.

5 Discussion

One conclusion of this cross-platform analysis resides in the complex socio-technological environment that a niche platformized industry community inhabits. Although, as Poell, Nieborg and Duffy rightfully underline that "digital platforms drastically reduced economic friction by cutting down on transaction costs, the costs incurred of doing business" (Tiwana, 2013; Poell, Nieborg and Duffy, 2022, p. 45), platformized industries come with very specific particularities. Thus, in order to be part of such expert communities, one needs to possess extensive technical knowledge regarding both the platforms within the ecosystem, but also regarding the resale market.

StockX can be conceived as a platform that restructures the digital environment (Kretschmer *et al.*, 2022) of the sneaker reselling process. Through its affordances, it allows more people to enter the market due to its ease of use and by removing many possible obstacles for sneaker resellers (creating listings, taking pictures, writing compelling descriptions, finding suitable shipping options) through standardization. However, it is this precise standardization which creates competition among complementors (Zhang, Li and Tong, 2022). As we have seen in the findings, there are mixed signals regarding how some users perceive their peers inside the group in terms of patience in the market and the ability to properly gauge the profitability of certain pairs.

Regardless, we posit that in this scenario, the community formation partially overrides this perceived competition between complementors. Most of the members usually prefer maintaining a constant level of profitability, which implies that timing the market based on the trendiness of the pair is not as relevant in their scenario.

As the pairs are shipped to StockX's warehouses where they get authenticated, this means that the platform itself emerges as a new organizational core (Dolata, 2022; Dolata and Schrape, 2022, 2023) of the resale process. Before the popularization of StockX, the sneaker resale market was largely based on trust between the buyer and seller. However, the platform company standardizes and streamlines the entire market, as one no longer needs a public profile and images of their product for potential buyers. For StockX, standardization becomes a core high-level affordance. This offers StockX a level of legitimacy through reliability, which in turn attracts more users to the platform, generating a strong network effect.

Watts (2019) argues that there is a pattern in the bid-ask spread, positing that the buyers and sellers who are less flexible with their pricing are slowly phased out of the market, with a large portion of the bid-ask spread remaining unfulfilled. What this implies for our research is that StockX's affordances encourage users to exit the market quickly by matching them with a potential buyer. From a sneaker reseller's point of view, coupling this with the fast-paced and real-time monitoring of websites that happens on Discord, it creates a competitive environment where acting quickly is highly beneficial.

This is one of the many conflicts and tensions which arise between StockX as a platform owner and its users, who are aiming for returns on their investment. This is in line with Dolata and Schrape's argument that platform companies are more than intermediaries (2023, p. 8), but rather serve as engaged actors with the capacity to effectively govern the entire sneaker resale market through their affordances and imagery. As we found out from the interviews and the netnography that the presence of commodified data as 'market data' on any given product page influences the decision of the users to exit the market.

Then, we witness how Discord becomes a knowledge-making machine where the market dynamics are formed. That does not mean everyone has equal access to this knowledge, as the community is informally hierarchized. The platform affords the creation of sub-groups through its multiple channel system with varying transparency. Thus, the everyday users are separated from the experienced and trustworthy members. The former discusses more general trends and have access to general knowledge, whereas the latter get access to exclusive information, experimental digital tools and critical market speculation.

One key insight derived from the netnography and interviews is how market gossip emerges. Similar to Bishop's algorithmic gossip (2019), we can observe how users speculate the market on Discord, which acts as a social action space (Dolata, 2022; Dolata and Schrape, 2022, 2023) that informs the business strategies of users, acting as complementors on StockX. However, market speculation alone is not enough for the users to establish their strategies; they compare the market gossip insights with the commodified data from the business infrastructure at hand - StockX. On top of that, personal track record, individual own means (monetary, product storage and distribution possibilities etc.), as well as personal business objectives act together to create users' strategies.

So, that is to say that even though generating monetary profit is streamlined on various platforms by means of quick and safe economic transactions (Smyrnaios, 2018; Poell, Nieborg and Duffy, 2022, p. 45), that does not mean everyone engages in the same practices. Overall, both platform affordances of StockX and Discord converge with the community practices and with individual business goals to determine the possibilities of action of complementors. Thus, only a cross-platform architecture can aid in investigating such complex visible and less visible processes.

A phenomenon of 'businessification' becomes apparent, where users treat StockX as a reliable company, a partner, a business infrastructure, upon which they apply their own business strategy. Discord aids in acquiring information that the users don't take at face value, but rather perform their own background checks. These are based on who produced the insight - an established power user versus an impatient new seller, what tools can be used to monitor commodified data or to buy pairs the fastest, what other platforms produce in terms of price volatility, demand fluctuation, consumers preference etc.

6 Conclusion

One of the main conclusions about StockX acting as a platform company is the 'businessification" of the sneaker resell market. In this sense, the StockX company capitalizes on trends like the assetization of sneakers and apparel and becomes an active actor of the platformization of the secondary market industry. In doing so, StockX commodifies traces of behavior, user interaction, financial activity, price fluctuation in a full-fledged process of datafication of this market. This gives StockX legitimacy, authority, as well as the power to predict offer and demand fluctuations and price changes. In the context of a grey zone in terms of regulation, as well as through its standardization

practices, StockX gets in an advantageous position within the platformized industry ecosystem.

The generalized impact that Discord-based sneaker reselling communities resides in their ability to organize and influence the market value of specific shoes. As retailers release certain shoe models at different rates from one country to another, this allows sneaker resellers to directly influence the value of shoes at a continental level. Therefore, their strategies and behavior become integrated parts of the ecosystem, where StockX acts as a business infrastructure and Discord as a social action space.

In the context of communities of users, perception may become actionable reality and the complementor strategies may suffer modifications in line with the community insights. However, the complementors also develop their own verification and evaluation strategies, based on what we call an informed market gossip, commodified data from various platforms, as well as their own means (economic and production oriented).

Lastly, we contend that the cross-platform approach into the architecture of a platform ecosystem aids to uncover the technical, communicational and commercial layers entrenched in a platformized industry. The cross-platform research methodology proposed showcases platform, medium and user culture sensitivity, thus allowing to produce culturally relevant research. Moreover, we find that this approach is indicative of other internet-based or platformized activities or other user cultures. One example is NFT collecting and trading, where StockX is replaced by OpenSea and as social action spaces Discord is accompanied by Twitter for hype creation and promotion.

References

Bishop, S. (2019) 'Managing visibility on YouTube through algorithmic gossip', New Media & Society, 21(11–12), pp. 2589–2606. Available at: https://doi.org/10.1177/1461444819854731.

Bucher, T. and Helmond, A. (2018) 'The Affordances of Social Media Platforms', in J. Burgess, T. Poell, and A. Marwick (eds) The SAGE Handbook of Social Media. London: SAGE Publications. Available at: https://doi.org/10.4135/9781473984066.

Davis, J.L. and Chouinard, J.B. (2016) 'Theorizing Affordances: From Request to Refuse', Bulletin of Science, Technology & Society, 36(4), pp. 241–248. Available at: https://doi.org/10.1177/0270467617714944.

van Dijck, J., Nieborg, D. and Poell, T. (2019) 'Reframing platform power', Internet Policy Review, 8(2). Available at: https://doi.org/10.14763/2019.2.1414.

van Dijck, J., Poell, T. and de Waal, M. (2018) The Platform Society. Public Values in a Connective World. New York: Oxford University Press.

Dolata, U. (2022) 'Platform Regulation. Coordination of markets and curation of sociality on the internet', in H.D. Kurz, M. Schütz, and S.S. Zilian (eds) The Routledge Handbook of Smart Technologies An Economic and Social Perspective. New York: Routledge, pp. 457–477. Available at: https://www.taylorfrancis.com/books/9780429351921/chapters/10.4324/97804293 51921-27.

Dolata, U. and Schrape, J.-F. (2022) 'Platform Architectures. The Structuration of Platform Companies on the Internet', SSRN Electronic Journal [Preprint]. Available at: https://doi.org/10.2139/ssrn.4018396.

Dolata, U. and Schrape, J.-F. (2023) 'Platform companies on the internet as a new organizational form. A sociological perspective', Innovation: The European Journal of Social Science Research, pp. 1–20. Available at: https://doi.org/10.1080/13511610.2023.2182217.

Evans, D.S. and Schmalensee, R. (2016) Matchmakers: The New Economics of Multisided Platforms. Cambridge: Harvard Business Review Press.

Floridi, L. (2016) 'Mature Information Societies — a Matter of Expectations', Philosophy & Technology, 29, pp. 1–4. Available at: https://doi.org/10.1007/s13347-016-0214-6.

Gillespie, T. (2010) 'The Politics of "Platforms"', New Media & Society, 12(3), pp. 347–364. Available at: https://doi.org/10.1177/1461444809342738.

Gillespie, T. (2016) 'Regulation of and by Platforms', in J. Burgess, T. Poell, and A. Marwick (eds) The SAGE Handbook of Social Media. Los Angeles: SAGE Publications, pp. 254–278.

Gorwa, R. (2019) 'What is platform governance?', Information, Communication & Society, 22(6), pp. 854–871. Available at: https://doi.org/10.1080/1369118X.2019.1573914.

Helmond, A. (2015) 'The Platformization of the Web: Making Web Data Platform Ready', Social Media + Society, 1(2), pp. 1–11. Available at: https://doi.org/10.1177/2056305115603080.

Kenney, M. and Zysman, J. (2016) 'The Rise of the Platform Economy', Issues in Science and Technology, 32(3), pp. 61–69.

Kernan, J. et al. (2020) Sneakers as an Alternative Asset Class, Part II, TD Cowen. Available at: https://www.cowen.com/insights/sneakers-as-an-alternative-asset-class-part-ii/ (Accessed: 31 May 2023).

Kitchin, R. (2014) The data revolution: big data, open data, data infrastructures & their consequences. Los Angeles, California: SAGE Publications.

Kozinets, R.V. (2019) Netnography: the essential guide to qualitative social media research. 3rd edition. Thousand Oaks, CA: SAGE Publications.

Kozinets, R.V. (2021) 'Netnography Today: A Call to Evolve, Embrace, Energize, and Electrify', in R.V. Kozinets and R. Gambetti (eds) Netnography Unlimited Understanding Technoculture Using Qualitative Social Media Research. New York: Routledge, pp. 3–23.

Kretschmer, T. et al. (2022) 'Platform ecosystems as meta-organizations: Implications for platform strategies', Strategic Management Journal, 43(3), pp. 405–424. Available at: https://doi.org/10.1002/smj.3250.

Light, B., Burgess, J. and Duguay, S. (2016) 'The walkthrough method: An approach to the study of apps', New Media & Society, 20(3), pp. 881–900. Available at: https://doi.org/10.1177/1461444816675438.

McIntyre, D.P. and Srinivasan, A. (2017) 'Networks, platforms, and strategy: Emerging views and next steps: Networks, Platforms, and Strategy', Strategic Management Journal, 38(1), pp. 141–160. Available at: https://doi.org/10.1002/smj.2596.

Morozov, E. (2013) To save everything, click here: the folly of technological solutionism. First edition. New York: PublicAffairs.

Nieborg, D.B. and Helmond, A. (2019) 'The political economy of Facebook's platformization in the mobile ecosystem: Facebook Messenger as a platform instance', Media, Culture & Society, 41(2), pp. 196–218. Available at: https://doi.org/10.1177/0163443718818384.

Plantin, J.-C. et al. (2018) 'Infrastructure studies meet platform studies in the age of Google and Facebook', New Media & Society, 20(1), pp. 293–310. Available at: https://doi.org/10.1177/1461444816661553.

Poell, T., Nieborg, D. and Van Dijck, J. (2019) 'Platformisation', Internet Policy Review, 8(4), pp. 1–13. Available at: https://doi.org/10.14763/2019.4.1425.

Poell, T., Nieborg, D.B. and Duffy, B.E. (2022) Platforms and cultural production. Medford: Polity Press.

Rogers, R. (2018) 'Digital methods for cross-platform analysis', in J. Burgess, A. Marwick, and T. Poell (eds) The SAGE Handbook of Social Media. London: SAGE Publications, pp. 91–100.

Smyrnaios, N. (2018) Internet oligopoly: the corporate takeover of our digital world. Bingley, UK: Emerald Publishing (Digital activism and society).

Srnicek, N. (2016) Platform Capitalism. Polity.

Srnicek, N. (2018) 'Platform Monopolies and the Political Economy of AI', in J. McDonnell (ed.) Economics for the many. London ; New York: Verso.

Srnicek, N. (2020) 'Paths Forward for the Study of the Digital Economy', in J. Muldoon and W. Stronge (eds) Platforming Equality: Policy Challenges for the Digital Economy. Autonomy, pp. 85–90.

Steinberg, L. (2018) The Profitable Hidden Sneaker Market, Forbes. Available at: https://www.forbes.com/sites/leighsteinberg/2018/09/17/the-profitable-hidden-sneaker-market/ (Accessed: 31 May 2023).

Tiwana, A. (2013) Platform ecosystems: aligning architecture, governance, and strategy. Amsterdam: Morgan Kaufmann.

Watts, A. (2019) 'Auctions with different rates of patience: Evidence from the resale shoe market', Managerial and Decision Economics, 40(8), pp. 882–890. Available at: https://doi.org/10.1002/mde.3056.

Yeung, K. (2017) '"Hypernudge": Big Data as a mode of regulation by design', Information, Communication & Society, 20(1), pp. 118–136. Available at: https://doi.org/10.1080/1369118X.2016.1186713.

Zhang, Y., Li, J. and Tong, T.W. (2022) 'Platform governance matters: How platform gatekeeping affects knowledge sharing among complementors', Strategic Management Journal, 43(3), pp. 599–626. Available at: https://doi.org/10.1002/smj.3191.

Zuboff, S. (2019) The age of surveillance capitalism: the fight for a human future at the new frontier of power. First edition. New York: PublicAffairs.

Responsible Standardisation for a Grand Challenge? Differences across Approaches to Sequestering Carbon in Soil

Jo Ann Brooks

Bentley University, United States of America

Abstract. As technologies and societies change, so too do standardisation processes. And in a world more digitally-mediated than ever, acknowledging the voices of technology users and downstream publics relative to decisions about features and capabilities of technologies is imperative (de Vries *et al.* 2018; Jakobs 2019). This shift can be supported by "out-of-the-box" thinking in two ways: 1) leveraging theoretical insights from disciplines beyond those focused directly on technological standardisation (de Vries *et al.* 2018), and 2) examining extreme cases highlighting the *de facto* standardisation processes that occur socially and which complement the more formalized processes of standardising specific technological innovations.

This research uses both strategies: it leverages institutional perspectives from social science and examines *de facto* standardisation processes of diverse approaches to a societal grand challenge. The paper summarizes findings from a preliminary investigation into how different sets of stakeholders are mitigating climate change through varied approaches to soil-based sequestering of carbon. Heuristic case analysis (Vaughan 1992) highlight institutional processes of legitimation and diffusion comprising *de facto* standardisation processes that complement more formalized processes of standards bodies and organisations. Theoretical and practical implications are discussed.

Keywords: Responsible standardisation; Stakeholders; Legitimation; Diffusion; Carbon Sequestration

1 Introduction

As the Call for Papers for STS Conference Graz's (2023) session on "(Responsible) Standardisation for (the Digital) Society" indicates:

> Today, standards for the digital domain are developed mostly by engineers and computer scientists, typically employed by large companies. As a result, technical expertise and economic interests guide standardisation and thus technical development; societal issues are hardly considered (if at all).
>
> [There is a need, then, for more research which investigates:]
>
> - Possible contributions of societal stakeholders to standards development
> - The role and representation of societal stakeholders in standardisation […]
> - Legitimacy and influence of different players in standards development

This research addresses that call, although in an unconventional way. Rather than investigating ways of expanding the range of stakeholders contributing input to formalized standardisation processes early in digital transformation processes, the paper emphasises the emergent *de facto* standardisation processes that complement more formal technology standardisation efforts.

In this Introduction, an argument for this alternative research approach is advanced through a brief overview of how technology standardisation processes have evolved and are continuing to evolve, and by noting that the grand challenges facing society today are a critical arena with which standardisation processes should be concerned well beyond the domain of technological innovation per se. A research question is then posed and the rest of the paper is outlined to conclude the Introduction, before results of the exploratory research are presented and discussed.

1.1 Co-Evolving Technologies, Standards, and Standardisation Processes

Technological standards today are typically developed to support interoperability between material artifacts. Yet such standards must also satisfy, however indirectly, requirements for coordination between and across the communities of practice that use the technologies. And as technologies, standards and practices evolve over time, the underlying standardisation processes also evolve (Yates & Murphy 2019; Lindgren, Mathiassen & Schultze 2021). To illuminate this point, I here briefly summarize three phases in this process along with their implications relative to standardisation processes themselves.

1.1.1 1800s-1980s: Technical Systems

Prior to World War I (WWI), most engineers worked as independent professionals who then assembled in committees and organisations to establish technical standards,

considering the needs of the greater public. After WWI, as more engineers began working for private employers, the decision-making and standardisation processes of consortia began to privilege the interests of corporate management, orienting away from the needs of the general public (Yates & Murphy 2019).

1.1.2 1980s-2010s: Networked Systems and End-user Applications

As digital technologies and networks proliferated, corporate and technical *consortia* and standards *bodies* such as IETF and W3C emerged to support *interoperability* across networked technologies. At the same time, user communities and managers, who had already invested in adapting to specific technologies, struggled to change their usage practices and organisational routines to accommodate the new technological capabilities. These changes sparked new areas of research such as work practice studies, sociotechnical systems (STS) and evolutionary economics, all of which continue to be useful in analysing social and organisational change related to "contained technologies with relatively clear boundaries" (Geels & Schot 2007; Lindgren, Mathiassen & Schultze 2021; Truffer 2023). In these cases, governments sometimes became involved, but public policy-makers generally preferred that private organisations manage standardisation processes.

1.1.3 2010s – Present: Digital Transformation

As digitalisation pervades the social world, implications ripple far beyond technical and user communities, impinging upon countless distant social and natural phenomena. Further, these implications intersect with each other, entangling social and ecological processes in increasingly complex and unanticipated ways. In this new age, responsible standardisation must find ways to take into account the increasingly broad and diverse populations and elements through which these implications are diffusing.

1.2 Standardising for Today's Grand Challenges

To understand how standards evolve in dynamic social and organisational contexts, it is important to recognize that any technology designed to provide a specific capability ultimately influences many and varied stakeholders who may see that capability's purpose and effects quite differently. Further, society and technologies are changing rapidly, so that purposes and capabilities at one point in time may differ only a few years later. This is especially true for society's "grand challenges" such as the climate crisis, water resources, peak oil, social inequality and immigration. Gaining insight into responsible standardisation relative to these challenges requires looking beyond the design stage of particular technologies.

Addressing these complex issues calls for extended inquiry into the evolving social contexts surrounding formal standardisation processes. Rather than simply expanding the number and range of stakeholders invited to contribute to existing tech standardisation processes as recommended initially for responsible standardisation, this paper *"flips the script."* It considers how diverse stakeholders are already developing *de facto* standards and standardisation processes to address a particular grand challenge. Instead of focusing primarily on standardising new technologies, this work centres social groupings and processes – and their key concerns – as key drivers of standardisation processes. In this way, it offers an obverse yet complementary view of responsible standardisation.

1.3 Research Question and Outline of the paper

To limit the research to a manageable scope, the paper considers how diverse communities of stakeholders are addressing one small, arguably standardisable aspect of a grand challenge, and defers the question of whether and to what extent technological solutions can be helpful. The grand challenge is climate change and the specific aspect under consideration for "standardising" is soil-based sequestration of atmospheric carbon.

In particular, this research addresses the question of: *"How are diverse sets of stakeholders shaping* de facto *standardisation around soil-based carbon sequestration (to mitigate climate change)?"*

The paper presents emergent findings from a preliminary investigation of different approaches to soil-based methods of sequestering atmospheric carbon. Each stakeholder community is concerned with a different manifestation or facet of the broader issue, has different access to resources, and different longer term priorities.

The remainder of the paper proceeds as follows: First a brief overview of institutional theory as it affords a useful perspective for analysing standardisation processes, is presented. Then an outline of the research approach taken, targeting one prototypical area for standardising technological approaches to mitigating climate change. The third section summarizes results as emergent themes regarding three "ideal types" of soil-based carbon sequestration, outlining for each:

- Description of the approach
- Key stakeholders and communities of practice
- *What* is being standardised
- Key institutional processes of legitimacy and diffusion
- Implications for research on responsible standardisation

The paper concludes with a discussion of implications for understanding how standards and standardisation evolve over time, and recommendations for responsible standardisation in broad societal contexts.

2 Theoretical Approach

Institutional theories are sociological perspectives concerned with stability and change of large-scale social processes and phenomena. Within this vast literature, *organisational institutionalism* is a stream of research which assumes that institutionalisation is an ongoing process of social and organisational change. Researchers are committed to explaining how individual actions interact with macro social processes through organisational and organising activities. They define institution as:

> "more-or-less taken-for-granted repetitive social behaviour that is underpinned by normative systems and cognitive understandings that give meaning to social exchange and thus enable self-reproducing social order. (Greenwood, Oliver, Suddaby & Sahlin 2008:4-5)

Organisational institutionalists consider that "something is 'institutionalized' when it has that rule-like status" (Greenwood, Oliver, Suddaby & Sahlin 2008:5) – a view that corresponds closely with Gey & Fried's (2018:254) view that "standards can be understood as rules".

Institutional theories are well-adapted for research on digital innovation and transformation (Hinings, Gegenhuber & Greenwood 2018), and offer a rich trove of analytical tools and frameworks for examining the processes through which standards are developed and diffused. Exemplary studies characterise the influence of institutional context on the social construction of standards and standardisation (Gey and Fried 2018), standards development organisations as "institutions in the making" (Olshan 1993), development of a Java technology standard (Garud, Jain and Kumaraswamy 2002), and the development of an organisational field grounded in the diffusion of a standardised form (Brooks 2013).

Legitimation and diffusion are institutional processes that explain, justify and influence standardisation processes. As Berger and Luckmann (1967) explain, and Meyer (2019) highlights, a nascent institutional order (such as standardisation) initially manifests through performance of social practices and roles. To become fully institutionalised / standardised, these social practices and roles must diffuse to additional practitioners and new generations. For this diffusion to occur, legitimation is required, harnessing normative and cognitive means of explaining and justifying the practices (Berger & Luckmann 1967; Meyer 2019). Legitimation then, is the process of explaining and justifying an institutional order; it typically entails both language and symbolisation.

Diffusion, a concept originally popularized by Everett Rogers' in classic work on diffusion of innovation, is the process that happens when "an innovation is communicated through certain channels over time among the members of a social system" (1983: 14). While

many studies since then emphasise relational processes of diffusion, Strang & Meyer (1993) find that categories and other abstractions are also highly relevant for diffusion processes. More recently, some theorists have begun substituting the term "translation" in place of "diffusion", to highlight that whatever is being diffused is also being changed in the process (viz. Czarniawska & Joerges 1996); yet the term "diffusion" arguably remains more relevant for research on standardisation.

3 Research Approach

The goal of this research is to explore social phenomena associated with *de facto* standardisation processes in the digital age. To foreground the needs of societal stakeholders, an extreme case – the grand challenge of climate change – is considered. Research is then focused on one concern around which substantial agreement already exists, and diverse approaches are examined to identify implications for responsible standardisation. Since the research question – *"How are diverse sets of stakeholders shaping* de facto *standardisation around soil-based carbon sequestration (to mitigate climate change)?"* – is a "how" question, qualitative research methods are appropriate.

3.1 Focal Phenomenon: Mitigating Climate Change through Sequestering Carbon in Soil

As a grand challenge, climate change involves a wide range of stakeholders with differing perspectives and approaches. It is therefore a useful context for examining the role and representation of stakeholders, along with their possible contribution(s), to standardisation processes.

The list of problems associated with climate change seems endless: warming temperatures, rising sea-levels, more intense weather patterns (storms, droughts, heat and cold spells), with priorities hard to establish or sustain. However, a starting point for studying standardisation is the general consensus that greenhouse gases (GHG) are a major source of many of these problems. There is also considerable agreement that one simplified version of the GHG problem – excess carbon in the atmosphere, especially CO_2 – _must_ be reduced for the future of humanity and life on planet. Further, there is agreement that leveraging the natural process through which carbon cycles through air, soil, plants and animals, is a practical means to mitigate many of the harm(s) inherent with climate change. To manageably bound the scope of this preliminary research project, I focus only on organic means of carbon sequestration (i.e., via soil and plants; not in the ocean, nor mechanical extraction or storage in building materials and then buried).
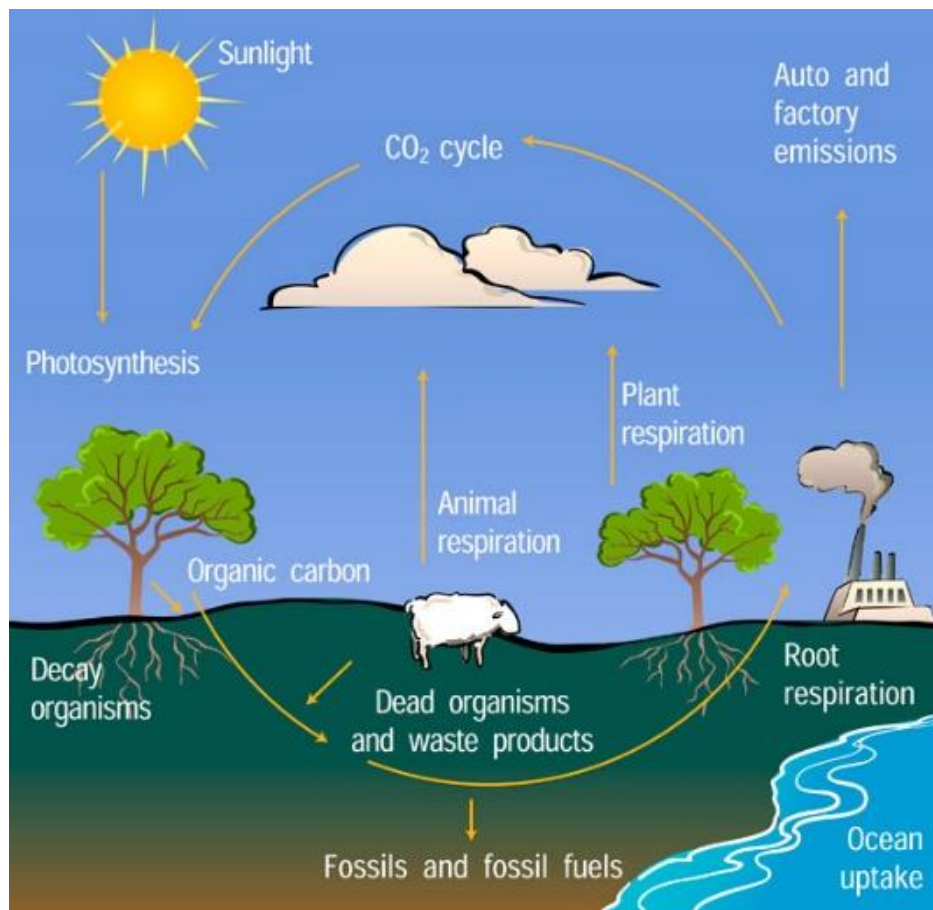
Figure 1: The Carbon Cycle

Image credit: UCAR Center for Science Education

Additionally, since selecting extreme cases is an important means of supporting theory development (Eisenhardt 1989; Seawright 2016; Yin 2009), this research examines several strikingly different approaches, grouped into three main "ideal types": carbon markets (CM), regenerative agriculture (RA), and indigenous "right relations" (RR).[14]

3.2 Data Collection

Data collection was carried out by the principal investigator beginning in summer 2020, initially through working as a volunteer for an environmental education and advocacy non-profit organisation. Data collection is continuing via a scoping literature survey (Arksey & O'Malley 2005) comprised of wide-ranging and publicly available sources including online websites and videos and in-person talks and seminars.

---

[14] "Ideal type" is a sociological construct that abstracts key characteristics of, and simplifies differences between, empirical instances of a phenomenon. In empirical reality, boundaries between these three approaches are fuzzy along a spectrum. Regenerative agriculture sits in the middle of the spectrum with carbon markets at one end and right relations at the other end of that spectrum.

3.3 Analysis

Data are being analysed through heuristic case analysis for theory elaboration (Vaughan 1992). This approach usefully circumvents presumptions that any one particular organisational form or technical approach is best suited for addressing the challenge; it also supports inclusion of groups commonly under-represented in more traditional standardisation schemes. Analysis includes attention to motivations for the standard / practice / technology (e.g., financial incentives vs. improving ethics and practices vs. improving return on farming efforts), and current means of legitimating and diffusing the standards, technologies and practices (e.g., peer-reviewed publications, certifications, best practice protocols). Emergent themes identified through this analysis illuminate *de facto* standardisation processes unfolding relative to a societal grand challenge. A high-level overview of different approaches to soil-based carbon sequestration is also supported.

3.4 Findings

The following three sections present emergent findings regarding the standardisation processes of approaches to soil-based carbon sequestration. Three ideal types are presented in terms of description, key stakeholders, what is being standardised, institutionalisation processes of legitimacy and diffusion, and key concerns relative to responsible standardisation for each.

4 Carbon Markets

4.1 Description

Carbon markets are an economic institution that enable large corporations with high greenhouse gas (GHG) emissions to offset legal and financial responsibility for the negative impact(s) of those emissions. Carbon markets are

> trading systems in which carbon credits are sold and bought. Companies or individuals can use carbon markets to compensate for their greenhouse gas emissions by purchasing carbon credits from entities that remove or reduce greenhouse gas emissions. (UNDP 2022)

Distinct from the "Cap and Trade" efforts required by federal regulations, these voluntary carbon markets credits can take a variety of forms, one of which is carbon sequestration in soil, the focus in this paper.

4.2 Key Stakeholders

As carbon markets are primarily the domain of large corporations, they interface with existing economic financial institutions, along with professional consultancies and research scientists such as silviculturists and geographers. Smaller entities, called Carbon Projects, focus on the technical aspects of measuring carbon and its sequestration on specific parcels of land. Land-owners and land stewards, typically in third world countries, are involved in these arrangements as well.

According to Becky Dickson of Terra Carbon LLC (2022) the institutional structure of carbon markets is:
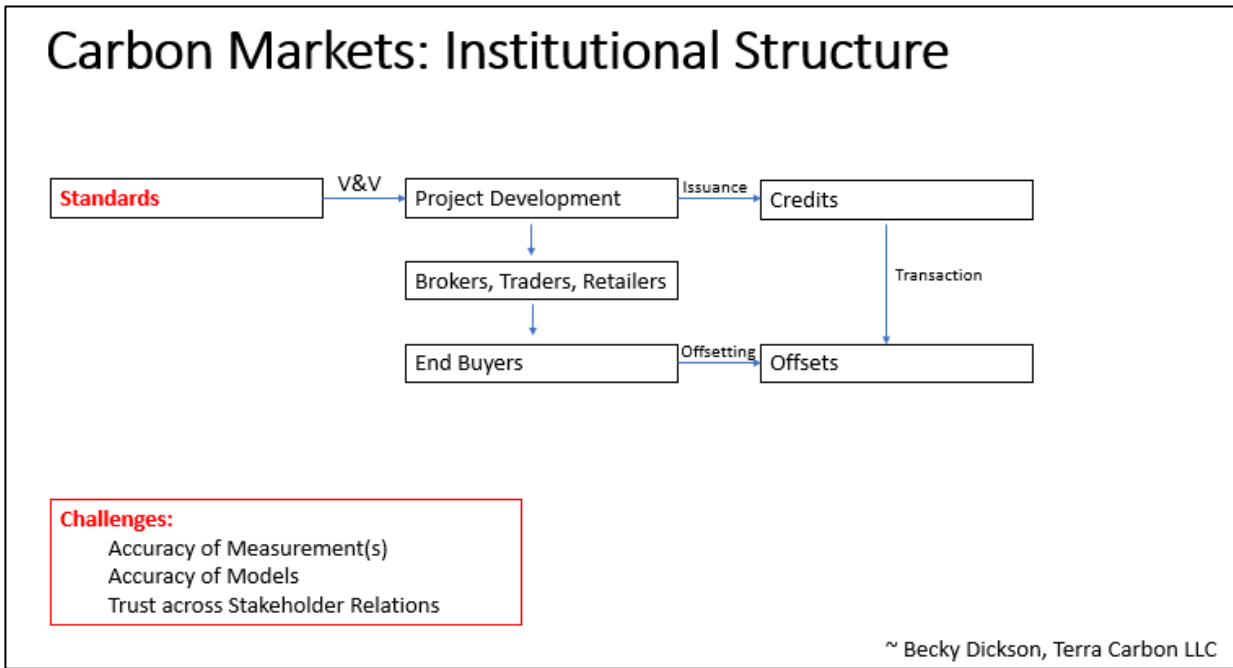
Figure 2: Carbon Markets: Institutional Structure

4.3. What is being Standardised?

The most central "object" in carbon markets is a *Carbon Credit* (or *Offset*) which is a (digital) information standard for one metric tonne of Carbon Dioxide equivalent (CO_2e) that can be bought and sold. Carbon credits are designed and maintained by organisational entities called Carbon Programs, which establish clearly-defined standards – of rules, procedures and methodologies – for accounting, assessing (external verification) carbon sequestration; they also track ownership of the credits via "registries".

Acctg
Methods
Indep.
Assessors
STD
Registry

Standard = complete set of
* rules
* procedures
* methodologies

~ Becky Dickson, Terra Carbon LLC
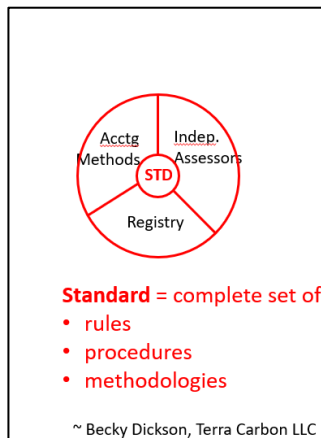
Figure 3: STD

There are four Main Standards, each developed by a different program: Verified Carbon Standard (by Verra), Gold Standard, American Carbon Registry (ACR), Climate Action Reserve.

4.4 Legitimation and Diffusion

4.4.1 Legitimation

Because carbon markets, credits and programs are largely digital and opaque to buyers, trust across stakeholders is a major concern. Stakeholders are concerned with reliability around a range of issues. To validate the economic leverage of reliance on carbon credits, three main parameters have been identified:

* "*Additionality*" – is the sequestered carbon "additional" to any carbon that would otherwise be sequestered anyway? Who determines this, and how? (subjective assessment!)
* *Permanence* – is the sequestered carbon going to stay sequestered permanently? How is this determined?
* *Non-Leakage* – is sequestration working the way it is claimed to be? (as verified by independent assessors)

Additional concerns regarding accuracy of assessment include:

* *Accuracy of measurement* – Precise measurement (testing) of carbon sequestration over large tracts of soil or land is highly cost-intensive and therefore not deployed as often as might be warranted. Instead, carbon markets typically rely heavily on computer models rather than extensive testing, which leads to a second concern...
* *Accuracy of models* – Many issues related to accuracy of the computer models are well-known, although knowledge and concern about these issues is not evenly distributed across the different stakeholder groups involved in carbon markets.

4.4.2 Diffusion

Carbon markets are situated within mainstream financial institutional contexts, affords a strong set of channels for diffusion. Additionally, land-owner associations and policy organisations are instrumental in linking specific plots of land to various carbon credit projects.

4.4.3 Risks and Challenges

Although carbon markets have been operating and expanding for some time, their legitimacy is increasingly being challenged. Distrust between stakeholders around assessments, permanence and additionality have been leading to negative ethical and legal ramifications. Problems with accurate measurement and trust have led to charges of corruption with some of the offsets recently being termed "worthless." As a case in point, the CEO of Verra (the largest carbon credit program) recently resigned following a media expose which accused the corporation of issuing millions of worthless credits (Guardian 2023).

4.5 Key Concerns and Insights for Responsible Standardisation

Environmentalists have been highlighting that GHG emissions are simply being turned into a "network externality" for some stakeholders, leading to charges of "greenwashing" as a major ethical and potentially legal concern, since carbon is not really being eliminated from the planetary system at all. Activists are also protesting the downsides of mono-crop silviculture in contrast to more biodiverse solutions. As a result of these legitimacy concerns, carbon markets are undergoing major structural change (Haya *et al.* 2023).

5 Regenerative Agriculture

5.1 Description

While there are many different definitions of regenerative agriculture (Newton *et al.* 2020), most include some reference to soil health. One clear definition is:

> Regenerative Agriculture is an approach to farm and ranch management that aims to reverse climate change through practices that restore degraded soils. By rebuilding soil organic matter and soil biodiversity we significantly increase the amount of carbon that can be drawn down from the atmosphere while greatly improving soil fertility and the water cycle. (CRARS-CSU/Chico 2023)

While too immature to be considered an institution in its own right, regenerative agriculture is closely allied with organic farming and permaculture and interfaces with and depends upon other more established institutions (see below).

5.2 Key Stakeholders

5.2.1 Key Occupational Groups

Full-time practitioners of regenerative agriculture include small farmers, employees of demonstration farms (see below) and scientific researchers investigating specific factors that contribute to regenerative agriculture. Most researchers and demonstration farms receive funding from government agencies and/or large corporations through land-grant universities, non-profit research groups and/or educational centers.

5.2.2 Peripheral Institutional Contexts

Currently, most regenerative agriculture practitioners integrate their work with broader local farming communities and distribution channels such as Farmers' Markets, farm-to-table restaurants, and community-supported agriculture programs. Many small farmers are active in national or global networks of peers and educators; these practitioners also typically maintain some connections with local training programs (e.g., community colleges, 4H clubs) and zoning boards. Large food and agricultural corporations may also be involved as partners in research projects, and/or running pilot programs or large-scale field experiments on their own.

5.3 What is Being Standardised?

The greatest concerns around standardisation focus on farming practices commonly employed to support soil health and carbon sequestration (or respiration). These include minimizing soil disturbance, supporting diverse vegetation, rotating crops, maintaining cover crops, applying compost and manure, and managing grazing animals (CRARS-CSU/Chico 2023).

5.4 Legitimacy and Diffusion

5.4.1 Legitimation

Small-scale regenerative agriculture leverages and is dependent upon specialized knowledge of practices and technologies adapted to specific soils, climates and regional landscapes. While practitioners and advocates claim major success, findings are primarily anecdotal; legitimation is typically established via best practice protocols (e.g., Northeast Organic Farming Association's Soil Carbon Grower On-Site Test Protocols and

Data Sheets) and certification programs (e.g., Soil Carbon Initiative's Farm-Level Commitment Programs).

In research programs concerned with large-scale application of regenerative agriculture techniques, interest is increasing in new, innovative technologies for measuring soil health. Most of these technologies are still under development with some at the venture capital stage. There are also Action Research Projects, such as Rodale's "Southern Piedmont Plateau" research program and California State University at Chico's Center for Regenerative Agriculture and Regenerative Solutions' Soil Carbon Accrual Project, although projects like these are quite expensive and typically depend upon external funding.

5.4.2 Diffusion

Diffusion of small-scale regenerative agriculture is limited because of the locally-specific and highly variable nature of soils, climate and vegetation. Nevertheless, diffusion of highly-effective small-scale techniques still occurs through:

- *Demonstration farms, community college and online educational and training programs (*e.g.*,* https://understandingag.com/).
- *Community organisations* (e.g., Northeast Organic Farmers Association)
- *Non-profit organisations at the national and international levels,* such as the Soil Carbon Initiative's (2023) effort to incentivize Farm-Level Commitment Programs; and the Rodale Institute's *Global Leaders in Organic Agriculture Research* program (Rodale Institute 2023).

Larger-scale approaches to diffusing regenerative agriculture are supported through government-sponsored research efforts (e.g., through US Dept. of Agriculture and National Science Foundation). These programs are oriented toward developing more cost-effective techniques for measuring carbon sequestration (e.g., flux towers, soil probes) over wider areas, or improving soil sampling and laboratory tests. Also on larger-scale efforts, Assessments on larger-scale projects may also be supplemented using infrared spectroscopy and satellite imagery. Other larger-scale channels of diffusion include academic and scientific research organizations (e.g., Center for Regenerative Agriculture and Resilient Systems' Soil Carbon Accrual Project at California State University / Chico; Rodale Institute; Woodwell Institute) and peer-reviewed publications.

5.4.3 Risks / Challenges

For small acreage farms, transitioning to regenerative agriculture represents a major risk to a family's survival which is often a season-to-season challenge anyway – a single seasonal failure can devastate an entire family's economic security. Meanwhile,

regenerative agriculture researchers find themselves caught in a Catch-22: struggling to obtain research funding because of their lack of peer-reviewed publications, hampered by a shortage of peer-reviewers due to limited/scarce research funding. These tensions are exacerbated by the high cost of accurate measurement technology needed to conduct replicable scientific experiments. Replication research is further constrained because so many relevant variables (climate, soil type, native vegetations) are locally-specific, rather than generalizable across larger regional areas and mono-crop-plantings. Some researchers anticipate that new measuring technologies currently under development will translate into success in using carbon credits or offsets to incentivize deploying regenerative agricultural practices on larger tracts.

Currently, the US Department of Agriculture funds a substantial research program on regenerative agriculture ("Climate-Smart Initiative"). However, most funding is directed to larger-scale agriculture pilot programs rather than small farms, with the rationale being that the former provide more "bang-for-the-buck". Fewer recommendations are needed for larger-scale changes (e.g., simple corn/soy rotations), than for smaller, 10-acre farms with more diverse crops and potentially more efficient land use.

5.5 Key Concerns for Responsible Standardisation

The new measurement technologies (e.g., "towers" for monitoring / measuring carbon flux from soil, or "probes" for measuring carbon accrual deep within soil) appear as the most attractive focus for responsible standardisation initiatives. Beyond those, other efforts towards standardisation remain challenging due to 1) local specificity of weather and soil conditions, and 2) risky financial stakes – both for converting traditional farms to regenerative agriculture and for innovative research on novel techniques and practices. Even the large-scale government research programs struggle to attain target outreach goals because of the financial risks facing both farmers and researchers.

6 "Right Relations" Approach

6.1 Description

The "Right Relations" approach has been practiced by indigenous peoples in North America and elsewhere for millennia. This approach understands that the "real solutions" to the climate crisis are in "Right Relations". The approach embodies and reflects a very different orientation than the typical western (European) world view. As Chief Oren Lyons of the Onondaga Haudenoshonee advises, people/humans need to approach the climate crisis with "'common sense' not 'dollars and cents' … there is no mercy in nature, only

the law… If you don't follow the law, you suffer the consequences… [in nature there are] no lawyers, no *habeas corpus*" (2022). Or as Tom Goldtooth, Executive Director of the Indigenous Environmental Network, explains: "Right Relations" entail "Responsibilities in relationship… Relationship to Mother Earth. …. Connecting and respecting all beings" (2022).

Evidence for the efficacy of this approach can be found in a report by the World Resources Institute & Climate Focus (2022):

> Forest lands stewarded by Indigenous people and communities in countries such as Brazil, Colombia, Mexico and Peru sequester about twice as much carbon as other lands, according to the analysis. (Neslen 2022)

Further support exists in general recognition that roughly 85% of most biodiverse land areas are stewarded by indigenous peoples who comprise only roughly 5% of the world's population.

Right Relations is an all-encompassing worldview, a deep and expansive way of being. Full explication is well beyond the scope of this paper; what follows simply highlights several aspects most directly relevant for carbon sequestration.

6.2 Key Stakeholders

From an indigenous perspective, key stakeholders include all people and life on Earth. Further, indigenous people do not view themselves as *owning* land; rather they feel that they *belong* to the land they inhabit. From this perspective then, additional stakeholders also include the earth and all sentient beings including the four elements (earth, air, fire, water).

6.3 What is "Standardised"?

Indigenous practices and approaches have much in common with regenerative agriculture practices and approaches, but predate by hundreds if not thousands of years. One such key practice is "intercropping" – cultivating complementary crops together that naturally support each other's growth (e.g., corn, beans and squash as "three sisters"). Similarly, blending cultivation of trees, plants and grazing animals to improve soil health, reduce weeds and pests (Heim 2020), and strategic burns of forests and prairies (Pyne 2019). Other practices include strategic water management, such as planting crops in mounds of soil to drain excess moisture in humid areas, or establishing dams and irrigation systems in dry climates.

6.4 Legitimation and Diffusion

6.4.1 Legitimation

Legitimation of this approach has always been strong within indigenous communities via a seven-generation philosophy in which "everyone has a voice." Furthermore, ceremonies are performed recurrently to honour all relations ("Mitakye Oyasin"), thereby legitimating the approach in an ongoing manner. Recently, new research-based claims are emerging to support these original voices, such as via the WRI report mentioned above (Neslen 2022).

6.4.2 Diffusion

Although support for indigenous right relations approaches is growing, major impediments are blocking diffusion of this approach. Internally, indigenous populations are already struggling simply to survive and sustain their way of life amid poverty and threats to their physical and cultural survival. Externally, they face racism, treaty violations and other land sovereignty challenges. As historical targets of genocide and land theft for centuries in the Americas, and likely longer in Europe and Asia, indigenous land protectors remain vulnerable today. They continue to face orchestrated violence on a regular basis – e.g., as pipeline protesters in the US and as environmental activists in Latin America; sovereignty continues to be their greatest concern.

For indigenous populations, sovereignty and survival are inextricably intertwined. As Goldtooth (2022) enumerates in his explanation of right relations: "Sovereignty. Self-determination. Inherent rights and sovereignty of self-determination over ancestral waters, lands and territories …. relationship to food." He goes on to stress:

> Everything I talked about is like serious. It's serious life and death stuff. It's right there, confronting us. You know, when we started to dig deep – dig deep into looking at climate change and looking at what solutions that the system was telling us. They even were tempting our people, to give us big money – millions of dollars if we participate in using our trees and our ecosystem for carbon offsets…. you know. … And it's like money is so tempting, you know, and I remember some friends of mine down in Ecuador in the Amazon, the Sarayaku. You know, they said, "We don't need money to protect our trees. We just need to be left alone and give us our title to our land. … Recognize our rights. We know how to live in this system, we don't need money." And you know, I liked that; that resonated.
> (Goldtooth 2022)

Yet it can be nearly impossible for indigenous spokespeople to even make themselves heard at global decision-making events around climate change. According to Minnie Degawan, a Kakaney/Igorot activist from the Cordillera region of the Philippines and a member of the International Indigenous Forum on Biodiversity (IIFB), "when discussions

take place about environmental protection, we are always ignored. That's a huge mistake" (Degawan 2023). Furthermore,

> …when it comes to the money, <u>Indigenous peoples</u> are being left out in the cold yet again. While the [UK government-sponsored meeting held in February 2023 to discuss generating more finance to conserve and restore nature brought] together private, public sector and philanthropy groups, we have no seat at the table. That's a mistake. Addressing this crisis is not simply about getting the numbers right. The question of how these funds will be spent should be part of the agenda too, including who will spend them. (Degawan 2023)

6.5 Key Concerns for Responsible Standardisation

Environmental justice issues are clearly at stake here. Indigenous populations have been historical targets of genocide and land theft. Yet as one analyst argues, if indigenous relations with land are not honoured, the Paris Climate Agreement will fail:

> To maximise the scope for Indigenous land protection, the WRI study calls for equivalent land ownership rights, legal recognition of Indigenous territories and community rights to free, prior and informed consent over forest projects.
> (Neslen 2022)

The right relations perspective that "everyone has a voice" is virtually identical to responsible standardisation's concern that all stakeholders should have input. Indigenous perspectives bring to the fore issues of role and representation of stakeholders. The central-most question for responsible standardisation then becomes which players in standardisation processes are considered legitimate enough to exert influence, and which not. How to include these voices of indigenous populations and non-human stakeholders?

Pursuit of this approach, however, raises concerns that its non-technical processes and consensual decision-making are generally more time and resource intensive (not as "efficient") than the more focused and quickly implemented trajectories of carbon markets and large-scale regenerative agriculture.

7 Commonalities and Differences across Carbon Sequestration Approaches

While characterisation of these three "ideal types" reflects an emergent theme of preliminary analysis, in actuality, boundaries between the three approaches to carbon sequestration are overlapping and porous. Many commonalities and differences extend across and through these approaches. For example, both carbon markets and

regenerative agriculture researchers are interested in innovation of cost-effective technologies for measuring soil carbon, while both small scale regenerative agriculture practitioners and indigenous communities share much in the way of practices and concerns.

Yet differences in economic scale across the approaches remain obvious. The financial power of carbon markets and research funding institutions contrasts sharply with the basic survival needs of indigenous communities. Meanwhile soil health scientists are seeking and developing more precise methods of testing soil carbon so they can produce the peer-reviewed research essential for obtaining continued funding, and perhaps more importantly, for legitimating and diffusing regenerative practices, to both carbon markets and small farmers.

Differences in governmental regulation are also significant: from the large government agencies regulating carbon markets, to local zoning boards approving small organic farms, to traditional peoples' struggle for sovereignty of land they have already inhabited for millennia.

More fundamentally, epistemological and ontological differences undergird these apparent differences. Carbon market programs and projects depend heavily upon modelling, whereas small-scale regenerative agriculture practitioners rely primarily on anecdotal evidence and observation to assess the quality of their flora and fauna. And while market institutions recognize carbon as a chemical element to be managed effectively for financial and legal ends, indigenous communities understand right relations as the only viable approach to sustaining life on Earth.

8 Discussion

8.1 Evolving and Competing Standardisation Processes

This preliminary study has leveraged institutional perspectives and heuristic case analysis to investigate and analyse standardisation processes around soil-based sequestration of carbon across diverse sets of stakeholders and communities. The study reveals that multiple *de facto* standardisation processes – understood as nascent institutionalisation processes – are already underway, influencing and influenced by multiple and diverse stakeholders and communities. And each set of stakeholders not only entails differing practices and resources, but has different understandings, goals, and interdependencies, as well as views of and relations to the natural environment. Analysis further suggests that these *de facto* standardisation processes continue to counterbalance some deficiencies of the more clearly-bounded technology

standardisation processes. This research thus re-orients us to intrinsic inseparability of formal and *de facto* standardisation processes.

Results of this study also confirm that existing social norms and resource allocation processes are privileging dominant financial institutions over other stakeholders in the economy (Davis & Kim 2015). This imbalance shapes standardisation processes through positioning financial resources controlled by powerful institutions (e.g., carbon markets) against the practical and efficacious knowledge of small-scale farmers and indigenous communities. These dynamics between institutional power and grassroots practicality will most likely continue to play out over the coming decades, and responsible standardisation research will benefit from taking this into account.

8.2 Theoretical Implications

8.2.1 Responsible Standardisation

In contrast to technology-centred views of responsible standardisation, this exploratory study expands that purview to include the *de facto* standardisation processes complementing the better recognized, formal processes of standards bodies and consortia. Through supporting inclusion of a wider array of stakeholders and concerns, the study contributes to understanding how standardisation processes themselves are evolving over time and demonstrates how an institutional perspective contributes value for analysing these processes. It also implies that research on responsible standardisation is likely to benefit from continuing to consider how standardisation processes change over the longer term.

8.2.2 Digitalisation and Grand Challenge

The institutional perspective used here helps point to the possibility of inherent limitations to digitalisation approaches to a grand challenge, at least for soil-based carbon sequestration. While diffusion occurs through both relations and abstract concepts or categories (Rogers 1983; Strang & Meyer 1993), fundamental contradictions between these may result in significant impediments to diffusing digital "solutions" to grand challenges: On the one hand, grounding abstract categories such as carbon credits in digital technologies makes them more readily diffusible across existing financial and economic institutions. On the other hand, the same digitalisation that enables carbon credits to diffuse efficiently is leading to major relational issues regarding its effectiveness. Relational trust between carbon market stakeholders seems is coming apart, precisely because the relationship between a single abstract standard (i.e., a carbon credit) and the multifaceted phenomenon it is purported to represent (i.e., carbon sequestration across different soil types, climate regions and agricultural practices) is not easily nor accurately characterizable.

8.3 Practical Implications

While the tenets of responsible standardisation appear desirable in the abstract, re-orienting them toward responsible standardisation for a grand challenge reveals that many of these tenets could be quite challenging to implement in practice. Institutional rigidity and resource allocation biases are contentious in any standardisation process, and stakeholders, funding, politics and resources are not always clearly identifiable or readily accessible. Even identifying a complete set of stakeholders can be challenging because differences in language and priorities are not always discernible from a distance. Nor is it reasonable to assume that standardisation bodies and processes will always have the requisite power or authority to invite relevant affected but non-central stakeholders, or to convene all stakeholders at the same time, or that stakeholders can agree on what needs to be standardised.

Results suggest instead that the tenets of responsible standardisation will need to be "tuned" for application to specific empirical cases. And addressing these issues becomes even more crucial in grand challenges when hierarchical management or explicitly-negotiated consensus are no longer feasible (Acemoglu & Roberts 2008; Banerjee & Arjalies 2021).

Given these concerns, two recommendations are offered:

1) Efforts to standardise standalone digital technologies may be more effective at reaching consensus through use of a modular approach and generating short-term working prototypes (Brooks, Carroll & Beard 2011) for testing out diffusion possibilities, as is occurring with soil carbon measuring technologies.

2) For including stakeholder input into early design decisions, conducting a *series* of public hearings may be most expedient. Rather than trying to convene diverse sets of stakeholders at a single place and time, these hearings could be advertised in advance across different communities, and facilitated through strategic negotiation processes such as open strategy and organisational democracy (Adobor 2019; Hansen et al. 2022; Hautz, Seidl & Whittington 2017; Seidl, Von Krogh & Whittington 2019). Establishing these hearings would need to consider relative advantages of standardising on technology or standardising on consultation and decision-making processes, or both? (viz. Brooks & Rawls 2012).

The hearings could solicit input and decisions around rules and recommendations for:

- Who negotiates / establishes standards and how?
- Whether and how an object of standardisation can be identified / measured?
- What could be standardised?

8.4 Limitations and Future Research

This exploratory inquiry is obviously limited in scope and generalizability; further research – both empirical and theoretical – is needed. On the empirical side, results from this preliminary exploration will be used to identify a more representative sample (Glaser & Strauss 1967) for further study. Theoretically, the institutional perspective on research in responsible standardisation may be strengthened through integration with other recent theoretical work on dialectics of technology standardization (Lindgren, Mathiassen & Schultze 2021), entanglement of long-term processes and digital social change (Büchner, Hergesell & Kallinikos 2022) and critical realist perspectives for understanding socio-technical transitions (Geels 2022).

Acknowledgements

References

Acemoglu, D., & Robinson, J. (2008). The role of institutions in growth and development, Vol. 10. . Washington, DC: World Bank.

Adobor, H. (2020). Open strategy: role of organizational democracy. Journal of Strategy and Management

Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. International Journal of Social Research Methodology, 8(1), 19-32.

Banerjee, S. B., & Arjaliès, D.-L. (2021). Celebrating the End of Enlightenment: Organization Theory in the Age of the Anthropocene and Gaia (and why neither is the solution to our ecological crisis). Organization Theory, 2(4), 26317877211036714.

Berger, P., & Luckmann, T. (1967). The Social Construction of Reality. New York: Garden City

Brooks, J. M. (2013). Growth of an Organizational Field for Infrastructure: US State and Local Fusion Centers, 2001-2012; Research-in-Progress. Paper presented at the Nineteenth Americas Conference on Information Systems, Chicago, Illinois. August 15-17.

Brooks, J. A. M., & Rawls, A. W. (2012). Steps toward a socio-technical categorization scheme for communication and information standards. In Proceedings of the 2012 iConference, Toronto, ON, 407-414.

Brooks, J. M., Carroll, J. S., & Beard, J. W. (2011). Dueling stakeholders and dual-hatted systems engineers: Engineering challenges, capabilities, and skills in government infrastructure technology projects. IEEE Transactions on Engineering Management 58(3), 589-601.

Büchner, S., Hergesell, J., & Kallinikos, J. (2022). Digital transformation(s): On the entanglement of long-term processes and digital social change; an introduction. Historical Social Research 47(3), 7-39.

CRARS, C.-C.-C. f. R. A. a. R. S. (2023). Regenerative Agriculture 101 [Electronic Version]. Retrieved 6/10/23 from https://www.csuchico.edu/regenerativeagriculture/ra101-section/index.shtml.

Czarniawska, B., & Joerges, B. (1996). Travels of ideas. In G. Sevon & B. Czarniawska (Eds.), Translating Organizational Change (pp. 13—48). Berlin: de Gruyter.

Daley, C., LaSalle, T., Johnson, D., & Tuvell, P. (2019). Center for Regenerative Agriculture & Resilient Systems Annual Report 2019: California State University, Chico.

Davis, G. F., & Kim, S. (2015). Financialization of the Economy. Annual Review of Sociology, 41, 203-221.

de Vries, H., Jakobs, K., Egyedi, T., Eto, M., Fertig, S., Kanevskaia, O., et al. (2018). Standardization: Towards an agenda for research. International Journal of Standardization Research, 16(1).

Degawan, M. (2023). Indigenous people are Earth's greatest champions. Listen to us – and watch biodiversity thrive. The Guardian. Fri 17 Feb 2023 05.30 EST. https://www.theguardian.com/commentisfree/2023/feb/17/indigenous-people-earth-biodiversity-environmental-protection

Eisenhardt, K. M. (1989). Building theories from case study research. Academy of Management Review 14(4), 532-550.

Garud, R., Jain, S., & Kumaraswamy, A. (2002). Institutional entrepreneurship in the sponsorship of common technological standards: The case of Sun Microsystems and Java. Academy of Management Journal, 45(1), 196-214.

Geels, F. W. (2022). Causality and explanation in socio-technical transitions research: Mobilising epistemological insights from the wider social sciences. Research Policy 51(6), 104537.

Geels, F. W., & Schot, J. (2007). Typology of sociotechnical transition pathways. Research Policy, 36, 399–417.

Gey, R., & Fried, A. (2018). Metastructuring for standards: How organizations respond to the multiplicity of standards. In K. Jakobs (Ed.), Corporate and Global Standardization Initiatives in Contemporary Society. (pp. 252-276): IGI Global.

Glaser, B. G., & Strauss, A. L. (1967). The Discovery of Grounded Theory: Strategies for Qualitative Research: Aldine de Gruyter.

Goldtooth, T. (2022). Establishing Right Relations: Real Solutions to the Climate Crisis and the 6th Extinction Event. On Institute for Social Ecology's ongoing series on race, ecology and climate justice [Video]. [Vermont]: Institute for Social Ecology.

Greenfield, P. (2023, Wed 18 Jan 2023). Revealed: more than 90% of rainforest carbon offsets by biggest provider are worthless, analysis shows. The Guardian.

Greenwood, R., Oliver, C., Suddaby, R., & Sahlin-Andersson, K. (Eds.). (2008). The Sage Handbook of Organizational Institutionalism.: Sage.

Hansen, J. R., Pop, M., Skov, M. B., & George, B. (2022). A review of open strategy: bridging strategy and public management research. Public Management Review, 1-23.

Hautz, J., Seidl, D., & Whittington, R. (2017). Open strategy: Dimensions, dilemmas, dynamics. Long Range Planning, 50(3), 298-309.

Haya, B. K., Evans, S., Brown, L., Bukoski, J., Butsic, V., Cabiyo, B., Jacobson, R., Kerr, A., Potts, M., Sanchez, D. L.(2023). Comprehensive review of carbon quantification by improved forest management offset protocols. Frontiers in Forests and Global Change 6, 958879.

Heim, T. (2020). The Indigenous Origins of Regenerative Agriculture [Electronic Version]. National Farmers Union - Climate Blog. Retrieved 6/10/23 from https://nfu.org/2020/10/12/the-indigenous-origins-of-regenerative-agriculture/.

Hinings, B., Gegenhuber, T., & Greenwood, R. (2018). Digital innovation and transformation: An institutional perspective. Information and Organization, 28(1), 52-61.

Jakobs, K. (2019). Shaping the Future through Standardization: IGI Global.

Lindgren, R., Mathiassen, L., & Schultze, U. (2021). The dialectics of technology standardization. MIS Quarterly, 45(3), 1187-1212.

Meyer, R. E. (2019). A note from a phenomenological institutional perspective." Institutions and organizations: A process view (2019): 33. In T. Reay, T. B. Zilber, A. Langley & H. Tsoukas (Eds.), Institutions and Organizations: A Process View: Sage.

Neslen, A. (2022). Protect Indigenous people's rights or Paris climate goals will fail, says report. The Guardian. (Thu 31 Mar 2022 09.00 EDT) https://www.theguardian.com/world/2022/mar/31/protect-indigenous-peoples-rights-or-paris-climate-goals-will-fail-says-report

Newton, P., Civita, N., Frankel-Goldwater, L., Bartel, K., & Johns, C. (2020). What Is Regenerative Agriculture? A Review of Scholar and Practitioner Definitions Based on Processes and Outcomes. Frontiers in Sustainable Food Systems, 4.

Olshan, M. A. (1993). Standards-making organizations and the rationalization of American life. The Sociological Quarterly, 34(2), 319-335.

Pyne, S. J. (2019). Fire: A Brief History (2nd ed.): University of Washington Press.

Rodale Institute. (2018). Regenerative Organic Agriculture and Climate Change: A Down-to-Earth Solution to Global Warming. Kutztown, PA.

Rodale Institute. (2023). Rodale Institute - Global Leaders in Organic Agriculture Research.

Rogers, E. M. (1983). Diffusion of Innovations. Detroit: Free Press.

Seawright, J. (2016). The case for selecting cases that are deviant or extreme on the independent variable. Sociological Methods & Research, 45(3), 493-525.

Seidl, D., Von Krogh, G., & Whittington, R. (2019). Defining open strategy: Dimensions, practices, impacts, and perspectives. In Cambridge Handbook of Open Strategy (pp. 9-26).

Soil Carbon Initiative. (2023). https://www.soilcarboninitiative.org.

Strang, D., & Meyer, J. W. (1993). Institutional conditions for diffusion. Theory and Society, 22, 487-511.

Truffer, B. (2023). Urban planning meets socio-technical transitions: Informal settlement upgrading reconfiguring the infrastructure-livelihood nexus (comment during Q&A after talk): International Lecture Series: Planning in Transition.

UNDP (United Nations Development Programme). (2022). What are carbon markets and why are they important? . https://climatepromise.undp.org/news-and-stories/what-are-carbon-markets-and-why-are-they-important . Accessed 20 October 2023.

Vaughan, D. (1992). Theory elaboration: The heuristics of case analysis. In C. C. Ragin & H. S. Becker (Eds.), What is a Case? Exploring the Foundations of Social Inquiry (pp. 173-202): Cambridge University Press.

World Resources Institute & Climate Focus. (2022). Sink or swim: How Indigenous and community lands can make or break nationally determined contributions. Forest Declaration Assessment.

Yates, J., & Murphy, C. N. (2019). Engineering Rules: Global Standard Setting since 1880. Baltimore: Johns Hopkins University Press

Yin, R. K. (2009). Case Study Research: Design and Methods: Sage

A Pathway towards Co-creating Responsible Standards for Digital Equity: A Case Study of Digitization of Women's Transit Safety in India

Swati Kumari[1], Raghvendra Singh Yadav[2]

[1]Institute for Advanced Studies on Science Technology and Society, Graz University of Technology, Austria

[2] Centre for Studies in Science Policy, Jawaharlal Nehru University, India

Abstract. It is well established that pre-existing biases of the socio-technical landscape get auto-embedded in algorithms leading to the persistent digital reproduction of social biases. Gender biases are one of the most prominent categories of existing biases in digital technologies. Gender biases are clearly reflected in the algorithms used in reproductive technologies, health technologies, employment and marketing platforms. This paper suggests the intervention before formulating logic for algorithms. In this context, the **primary objective** of this research paper is **to provide a methodological pathway for responsible co-creation of the standards for gender equity in digital technologies**. The research paper seeks to answer the question of **how to co-create inclusive responsible standards of gender equity for the digitization process.** To address the research question, the paper utilizes both primary and secondary data. Primary data is taken from the field survey done in Delhi, as a part of a larger project on women's safety in transportation. The survey was designed by using a modified **Responsible Research and Innovation Framework.** The survey has used a **mixed-method participatory approach**, where qualitative methods included, in-depth interviews and focus group discussions, and quantitative methods included statistical modeling using SPSS software. The universe of the field survey was women commuters of Delhi, belonging to different ages, classes, educational backgrounds, reproductive cycle stages, and locations. The paper provides a pathway for harmonious intersectional reconciliation of diverging interests for responsible standards of women's transit safety.

1 Introduction

Digitization is considered a key to unlocking the development potential among policymakers. Especially in developing countries, digitization is assumed to be the most efficient pathway for removing bottlenecks and boosting the services to the citizens.

Digitization in multiple sectors despite having efficiency advantages, is also riddled with fundamental questions such as 'equity' which manifests as a digital divide (Bakon et al., 2020). Socially disadvantaged groups including women are more affected by the digital divide in terms of access as well as opportunities (Acilar and Sæbø, 2023). To move towards an inclusive digitized future, it is critical to understand the type and nature of the relationship between social inequalities and the process of digitization. The two significant facets of the relationship between the digital divide and social inequalities include access to ICT services and the inherent design of the digital infrastructure. This paper focuses on the latter and attempts to develop an understanding of how the inherent design of technology development is influenced by preexisting social inequalities.

1.1 Digital Divide and Social Inequalities

New technologies come and operate in social contexts and digital technology is no different. Prevailing social and cultural norms have a defining impact on the shaping of these technologies. For instance, Bala and Singhal (2018) identified social norms, financial restrictions, and exclusion from fundamental technological skills as the causes of the gender gap in ICT usage. The family members' consent for women to use and access the internet is the most crucial social norm in India (Bala and Singhal, 2018). The influence of the prevailing social norms on embedded values of technology also means that the personal biases of the innovators or technology creators getting encapsulated in the digital products and services. Without any conscious efforts and awareness, there are high chances of auto-embedding social biases in digital products, processes, and services. Such auto-embedding effectively leads to the digital reproduction of social inequalities including gender biases, rural-urban divide, and racial and ethnic discrimination (Choi et al., 2022). Pre-existing social inequalities are reflected in digital platforms in multiple sectors including marketing, advertising, (Chang et al., 2021), financial sector, (Mogaji et al., 2020), and the criminal justice system (Ugwudike, 2022). Even WHO has come out with ethical guidelines for digital health platforms (Organization, 2021), and there is increasing demand for considering gender intersectionality in digital health services (Figueroa et al., 2021). Studies on the digital divide report the presence of algorithm biases as the major factor in perpetuating social inequalities, but, the big question is how it is happening.

1.2 Vicious Cycle of Algorithm Biases

Broadly speaking, a fundamental of the current digitization process is machine learning where, a large data set is used for finding patterns, developing logic and modeling that logic. Based on the logic, algorithms are developed which later translate into digital products (i.e. Android applications) or digital platform-based services. At every step of

the algorithm development process, there are very high chances of biases entering into the cycle (Marjanovic et al., 2022). For instance, how the data has been collected, has the data been sanitized from biases? If feed data is skewed and have biases then these biases get amplified at each step in developing algorithms. There is also the issue of the feedback loops of the data sets used across sectors for making predictive decisions which have implications for vulnerable groups in accessing services (Qureshi, 2020). For example, data from health apps are used by hospitals, and data from insurance companies are used by financial institutions for making financial credit decisions for individuals. Thus, trapping the vulnerable groups in a vicious cycle of deprivation.

The embedding of biases in algorithms intensifies the existing social inequalities because of the speed of diffusion of biases through digital platforms (Marjanovic et al., 2022). For instance, making a biased, discriminatory decision is as fast as downloading a digital App or a simple tap on an App. Another important concern regarding biases in algorithms is the 'universalization of social inequalities' (Choi and Cristol, 2021). Every day new communities are coming under the fold of digitization hence communities are also exposed to new biases. One of the biggest challenges for data-driven development and automation of services is to protect the privacy of highly vulnerable groups. Gender biases are one of the most prominent categories of existing biases in digital technologies. Gender biases are clearly reflected in the algorithms used in reproductive technologies, health technologies, employment, and marketing platforms. Thus, this paper focuses on gender biases in algorithms.

1.3 Objective

There are two potential approaches to counter gender biases in algorithms. One is a gender audit of the algorithms to identify and filter the biases. This approach relies on opening the black box of the algorithms from the perspective of, who designed the algorithms, why particular algorithms, and how it was designed. Another approach is to adopt a gender-responsive pathway for ideating and actualizing particular algorithms. This approach focuses on the intervention before formulating logic for algorithms. However, the meaningful application of both approaches requires a guiding framework setting standards for gender equity. In this context, the **primary objective** of this research paper is **to provide a methodological pathway for responsible co-creation of the standards for gender equity in digital technologies**.

2 Wicked Problem of Biased Algorithms
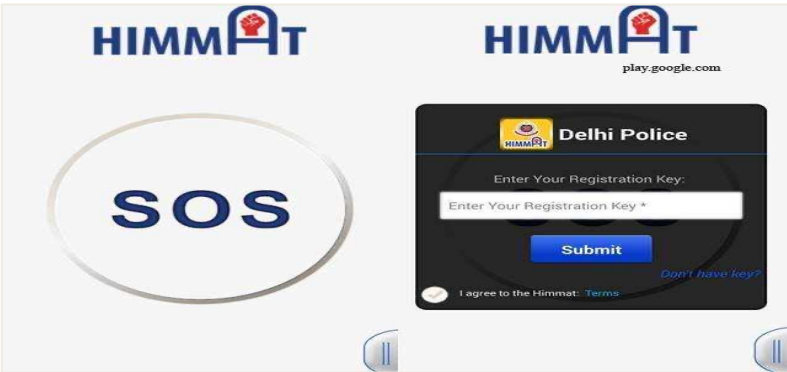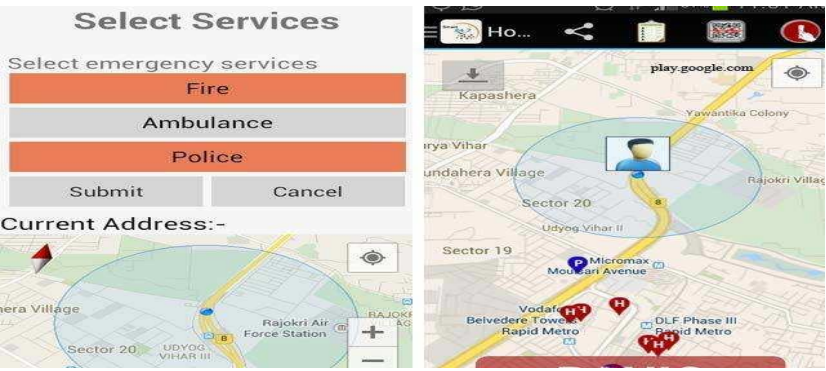
The problem of biases in algorithms is rooted in the complex web of interaction between the process of technology development and society. Before offering a solution, it is crucial to understand the reasons for the embedding of the biases in the algorithms. It is well understood in Innovation studies that the social sustainability of new technologies is critical for the long-term economic viability of the products (Missimer and Mesquita, 2022). Still, due to several reasons, firms do not pay adequate attention to filtering the biases. One of the most prominent causal factors is cut-throat competition among firms in digital sector innovations where 'time' is a critical determinant of profit (Akter et al., 2021). Though many companies have brought up the 'code of ethics for program developers, however, due to the persistent paucity of time such codes at large remain the passive document (Gal et al., 2020). In such situations, firms tend to use the earliest available data set without much attention to social biases in the data. Another issue is the short-term focus on profit in the firms based on maximum profit in minimum time, which may even be detrimental in the long term. Thus the 'ephemeral' nature of digital innovations has very limited scope for ethical concerns such as social biases (Gal et al., 2020). On the other hand, it has been observed that the higher the vulnerability of a particular group to biased algorithms lower the knowledge of the existence of the biases in that group. Understanding 'information asymmetry' from the perspective of vulnerable groups is crucial for understanding the circulation of gender inequality in the digital realm (Alvesalo-Kuusi et al., 2022). At the same time even if there is an intention to be responsible firms are so devoid of social realities and have cut-off work cultures that there is a lack of knowledge and methods to develop inclusive digital products. The biggest challenge is to address the question of 'intersectionality' (Bala and Singhal, 2018; Choi and Cristol, 2021; Figueroa et al., 2021) through participation. The research paper seeks to answer the question of **how to co-create inclusive responsible standards of gender equity for the digitization process.** The following sections are dealing with the empirical study conducted and subsequently suggested methodological pathway for developing the inclusive gender-sensitive algorithm for women's transit safety.

3 Research Design, Methods and Procedures

A Responsible Innovation Framework (Buhmann and Fieseler, 2021; Dreyer et al., 2017; Steen et al., 2021; Stilgoe et al., 2013) including the dimensions of anticipation, reflexivity, responsiveness, and participation has been used for research design. This research work has used both primary and secondary data. For collecting primary data, a multi-round

field survey has been conducted among women commuters of public transport in Delhi, India. The sample size of the survey is 326 women commuters belonging to diverse groups formed around different parameters (discussed in detail in section 4). The hybrid Purposive Sampling technique was used to give representation to diverse sections of women commuters. Structured written questionnaires and semi-structured interviews were used to ensure the participation of a diverse group of women commuters.

For secondary data literature survey is done. Also, the existing women transit safety apps[15] in Delhi, such as 24*7 Smart, 'Safety pin', and 'Himmat' were analyzed from the Responsible Innovation perspective and gaps have been identified. Table.1 gives the output images of these safety apps

App Name	Screen Picture
Himmat	
24*7 Smart	

---

[15] Transit safety apps in Delhi specifically aim to enhance women's safety in the city. However, the inherent logic of these apps is GPS-based surveillance. These apps usually also have a crisis button to inform the security agencies in case of any unsafe incidents. However, the functional utility of these apps has been very limited the logic and parameters used for constructing these apps along with daily usage do not reflect the issues and concerns of everyday women commuters. Currently, 112 India, My Safetypin, Sheroes, bSafe, Himmat, Smart 24x7, Shake 2 Safety are prominent women-oriented digital safety apps in Delhi.
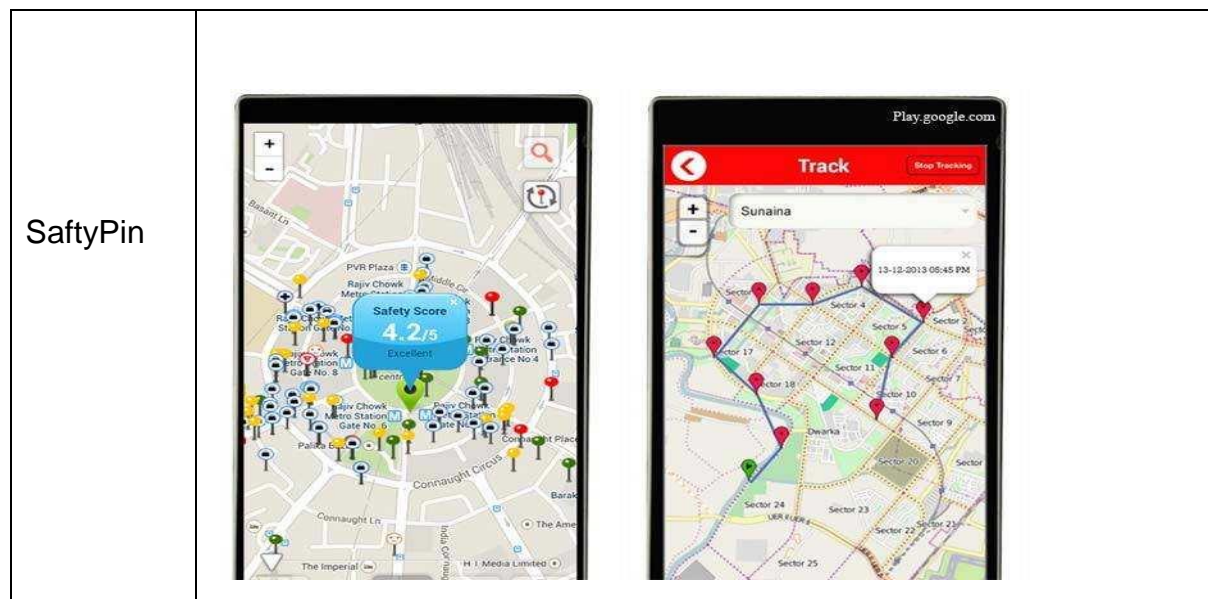
Table 1: Women safety aaps in Delhi screen shots

3.1 Gaps in the Digital Response to Women's Transit Safety

Existing apps and helplines promoted to address the crisis situation miss out on the intersectionality among women commuters and treat women commuters as a monolithic category. Hence diverse safety needs of women belonging to diverse groups cannot be addressed through these apps. Similarly, while developing the logic of these apps parameters like time and location were not factored in, while it is well established that there is a strong correlation between the women's perception of safety with time and location. The existing digital response focuses on the preservation of the physical being only and equates women's safety with physical safety only. This understanding is very limited as conceptual development in the field of gender transit safety shows that 'psychological safety' plays a significant role in perception formulation and making decisions on the mode of transportation among women commuters (Ceccato et al., 2022; KUMARI and SINGH, 2019). All these gaps necessitated a fresh understanding of women's safety from women's own perspective and translating that into an inclusive algorithm. The following section discusses the field study conducted to develop a logic of women's safety in transportation in an inclusive and participative way.

4 Field Survey Description

A multi-round field survey was conducted in Delhi's Public Transport System to collect cross-sectional data from women commuters. The city of Delhi has well well-developed Public Transport System including the rails, metro, buses, auto-rikshaws and e-rikshaws.

The city of Delhi has a notorious reputation for a worrisome situation of women's safety in public transportation especially in the bus transport system Mukherjee Mukherjee (KUMARI and SINGH, 2019; Mukerjee, 2019). Despite the government's efforts to improve the situation with multiple gender-sensitive schemes, the perception of women's safety has not improved. Thus, the Delhi bus transport system is an interesting case to study and find out the gap between the solutions offered for improving women's safety and the impact on the ground level. The survey was designed to capture the perceptions and expectations of the women using bus services in Delhi. Keeping the women commuters' socioeconomic and educational background, the survey was designed to collect qualitative and quantitative data. The qualitative data was further converted into quantitative data in consultation with the participants of the survey in multiple rounds.

To address the intersectionality among women users of public buses different categories were created based on age, income, education, and reproductive cycle stage. Within the category of age, data was collected from women belonging to the age group, up to 18 years, 18-40 years, 40-60 years, and above 60 years. Similarly, different subcategories were created to be inclusive of diverse educational backgrounds and different income levels among women commuters. The issues faced by women during various stages of the reproductive cycle have been completely absent from the transit safety discourses. Hence, under the reproductive cycle stage, data were collected from women experiencing or experienced, menstruation, pregnancy, lactation, and menopause-related issues while using public transportation.

It is well established that women's perception of safety is closely associated with time. Thus, data was collected to capture the women's expectation of safety during different times of transportation such as early morning, peak hours, evening, and late nights. However, the sense of time among women commuters depends on location. Like any other global megacity, Delhi also has dynamics of 'center & periphery' meaning the existence of the different transport cultures in the central and peripheral locations. For instance, the late-night time has a different meaning for women commuting in or to central and peripheral locations of the city. Thus, the survey was designed to include the voices of women commuters belonging to different parts of the city including the central part of Delhi and peripheral locations. The central and peripheral locations were determined by the geographical location and availability of the mode commutations.

The collected data has conversed into the 'values' women commuters aspired to be included in safety response. Thus, it is prudent to include the values related to women's safety in digital response towards enhancing women's safety in public transportation. Based on this data the statistical model is developed for analyzing various correlations between the safety expectations and issues to group characteristics. The following section discusses the major findings of the data analysis.

5 Findings

Analysis of collected data shows that different groups of women have different expectations in terms of transit safety. However, analysis of the logic of the existing digital apps shows that women's safety has been treated the same for all women without factoring in the time and location. The survey shows that since women are not a monolithic category, the safety needs of women commuters depend on a variety of factors. Such a gap indicates that understanding of women's safety among technology developers is assumptive and not reflective of the voices of women. In the absence of anticipation of parameters of safety from women's own experiences, existing apps remain generic and fail to enhance the sense of safety among women commuters. Therefore, the perception of the utility of these apps among women commuters is not favorable. Further, before constructing the logic these apps have not collected any primary data thus, they miss the community participation potential of responsible digital solutions. Apart from the heterogeneity and intersectionality present in the perception of safety, the study also finds out that for women commuters, psychological safety is equally important to physical safety. Which requires empathy and responsiveness for a meaningful solution as well as enhancing the perception of public transportation.

For the women commuters belonging to the lower economic income groups, economic safety in terms of affordability was found to be strongly correlated with overall safety needs. It was also found that pregnant women and young mothers are more concerned about the impact of pollution on the health of children. Thus, the study brought out four important components of women's overall transit safety as- Physical safety, Psychological safety, Economic safety, and Environmental safety. However, the data analysis shows that women in different parts of the city give variable weightage to these safety components. Even at the same location women belonging to the same group give different weightage to different safety components at different times. For instance, in some peripheral areas, women belonging to under 18 years of age in the low-income group give more weightage to physical safety during early morning and late night, but during the day economic safety concerns play a determining role in transit choices. Without including such nuances in constructing the logic for algorithms, the data collected by the safety apps remains skewed.

The study shows that there is inevitable friction of interest among different groups of women commuters. For example, the data shows that older women have a strong preference for enhancing surveillance through CCTV and security personnel whereas women with higher education (graduation and above) considered the increased surveillance ineffective and an infringement upon privacy. Similarly, women with high education understood the concept of autonomy and connected it with safety, while in the

rest of the groups, autonomy was one of the least preferred aspects of safety exhibiting a lack of utility of autonomy. Captive women commuters belonging to higher income groups prefer more privacy and comfort but women commuting from the peripheral areas for work to the city belonging to a low-income group (i.e. sanitation workers, domestic help) consider availability and reliability larger issues for safety. Thus, there exists a complex web of correlations embedded in the women's psychological process regarding feeling safe while using a public bus. It is challenging to balance the diverging safety requirements of women commuters, but without being responsive to the specific needs of a particular group the safety algorithms do not have any meaning to the women commuters. This is the reason most of the women commuting on buses do not use the existing safety app and many women are even found to be unaware of the existence of women's safety apps. This also indicates the lack of participation.

Most of the women respondents agreed that they would be able to trust the safety apps more if they had a way to participate in them. We propose a way for women commuters to participate by sharing their experiences in real-time which will act as feedback for other women commuters. In simple terms, women themselves decide the safety status of a particular location. The following sections discuss the proposed pathway for co-creating responsible digital responses for enhancing women commuters' sense of safety while using public transportation.

5.1 Proposed Pathway

The proposed pathway has interconnected multiple steps:

Step 1: Identify the different groups of the women commuters. For such groups, the possible parameters could be age, income, location (center or periphery), and reproductive cycle stage.

Step 2: Identify the safety issues and needs for each identified group of women commuters. We propose to identify the safety needs by ensuring the participation of each group and giving representation to each group's expectations. The group expectation needs to be categorized into parameters. Collaboration with social scientists and academic institutions at this stage can enhance the quality of the research. Define Safety for each group in terms of the underlying parameters.

Step 3: Define Safety for each group in terms of the underlying parameters. The parameters must reflect the women commuter's physical, psychological, economic, and biological safety needs.

Step 4: Statistical Modelling for establishing correlations. Each parameter is to be assigned a particular ranking point, for a particular safety parameter by each specific group. Weighted Averages would be applied to harmonize the diverse ranking of the parameters by different groups.

Step 5: Develop the algorithm based on correlations in the statistical model.

Step 6: Develop a digital product. Create an add-on based on the developed algorithm for the already existing transport Apps for specific cities. Here women commuters can share their experience of the commutations.

Step 7: Maintain the digital cloud from the data feed collected from the women commuters. The data cloud is the nodal point to provide feedback to women commuters based on the ranking of a particular transport area.

Figure 1 shows the entire suggested plan for developing an inclusive participative digital solution for transit safety apps.
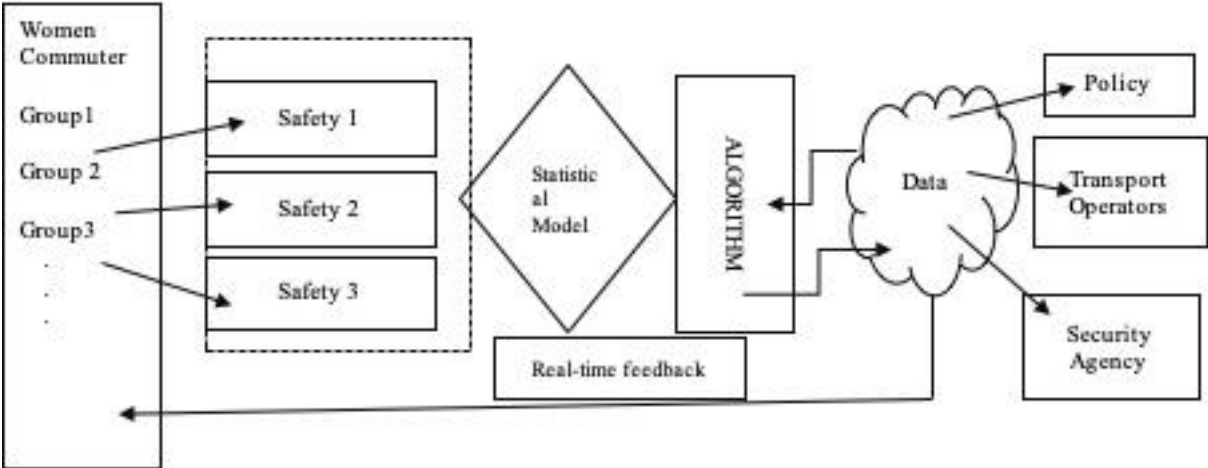
Figure 1: Proposed Pathway for Co-creating Responsible Algorithm for Women's Transit Safety

Many women respondents expressed an inability to do anything about the unsafe transport situation and feeling unsafe every day is very frustrating. Thus, providing a gateway to express feelings is a good starting point for ensuring the psychological safety of women commuters. The data cloud can be analyzed to provide inputs to security agencies in case of an emergency situation and identify the hotspots where women often feel unsafe while commuting. By analyzing the data, the transport managers can enhance their quality of service and attract more women commuters. In the long run, the data could be analyzed to find patterns and can provide critical policy inputs regarding women's safety in public transportation.

6 Discussion

It is clear from the field study and analysis of existing women's safety Apps that there is a knowledge gap between academic research (i.e. this study and other studies from different cities across the world) and understanding of women's safety among digital app developers. The academic research on women's safety offers deeper insights including highlighting the psychological aspects of safety which brings into question the effectiveness of the existing Apps. Thus, there is a need to translate academic knowledge into digital products with collaboration and consultation between academic institutions and technology development firms. Being responsive to the needs of women commuters such an approach has potential for economic as well as social sustainability. However, there are genuine concerns and limitations of the digital technology developers which we need to consider before proposing a methodological pathway for developing algorithms in an inclusive, participative, and responsible way. Currently, it is evident that there is unpreparedness in firms regarding upholding the moral overload of the digitization process. At this juncture, there is great potential for increasing the stakeholdership of academic institutions. Engagement with academic institutions before developing the logic or creating relevant data sets can help reduce the biases in the algorithms and lead toward a more inclusive digitization process.

References

Acilar, A., Sæbø, Ø., 2023. Towards understanding the gender digital divide: A systematic literature review. Glob. Knowl. Mem. Commun. 72, 233–249.

Akter, S., McCarthy, G., Sajib, S., Michael, K., Dwivedi, Y.K., D'Ambra, J., Shen, K.N., 2021. Algorithmic bias in data-driven innovation in the age of AI. Int. J. Inf. Manag.

Alvesalo-Kuusi, A., Malik, H.M., Viljanen, M., Lepinkainen, N., 2022. Dynamics of social harms in an algorithmic context. Int. J. Crime Justice Soc. Democr. 11, 182–195.

Bakon, K.A., Elias, N.F., Abusamhadana, G.A., 2020. Culture and digital divide influence on e-government success of developing countries: a literature review. Bakon Kinn Abass Cult. Digit. Divide Influ. E-Gov. Success Dev. Ctries. Lit. Rev. 15 1362–1378.

Bala, S., Singhal, P., 2018. Gender digital divide in India: A case of inter-regional analysis of Uttar Pradesh. J. Inf. Commun. Ethics Soc. 16, 173–192.

Buhmann, A., Fieseler, C., 2021. Towards a deliberative framework for responsible innovation in artificial intelligence. Technol. Soc. 64, 101475.

Ceccato, V., Gaudelet, N., Graf, G., 2022. Crime and safety in transit environments: a systematic review of the English and the French literature, 1970–2020. Public Transp. 1–49.

Chang, H.-C.H., Bui, M., McIlwain, C., 2021. Targeted Ads and/as Racial Discrimination: Exploring Trends in New York City Ads for College Scholarships. ArXiv Prepr. ArXiv210915294.

Choi, E.Y., Kanthawala, S., Kim, Y.S., Lee, H.Y., 2022. Urban/rural digital divide exists in older adults: Does it vary by racial/ethnic groups? J. Appl. Gerontol. 41, 1348–1356.

Choi, M., Cristol, D., 2021. Digital citizenship with intersectionality lens: Towards participatory democracy driven digital citizenship education. Theory Pract. 60, 361–370.

Dreyer, M., Chefneux, L., Goldberg, A., Heimburg, J. von, Patrignani, N., Schofield, M., Shilling, C., 2017. Responsible innovation: A complementary view from industry with proposals for bridging different perspectives. Sustainability 9, 1719.

Figueroa, C.A., Luo, T., Aguilera, A., Lyles, C.R., 2021. The need for feminist intersectionality in digital health. Lancet Digit. Health 3, e526–e533.

Gal, U., Jensen, T.B., Stein, M.-K., 2020. Breaking the vicious cycle of algorithmic management: A virtue ethics approach to people analytics. Inf. Organ. 30, 100301.

KUMARI, S., SINGH, R., 2019. E-Mobility Through RRI to Achieve Social Sustainability: A Case Study of Women Commuters of Delhi, India, in: Proceedings of the STS Conference Graz 2019. Presented at the STS Conference Graz 2019, TU Graz, Graz. https://doi.org/10.3217/978-3-85125-668-0-24

Marjanovic, O., Cecez-Kecmanovic, D., Vidgen, R., 2022. Theorising algorithmic justice. Eur. J. Inf. Syst. 31, 269–287.

Missimer, M., Mesquita, P.L., 2022. Social Sustainability in Business Organizations: A Research Agenda. Sustainability 14, 2608.

Mogaji, E., Soetan, T.O., Kieu, T.A., 2020. The implications of artificial intelligence on the digital marketing of financial services to vulnerable customers. Australas. Mark. J. j-ausmj.

Mukerjee, N., 2019. Investigating women's safety in New Delhi's urban transport systems. Int. J. Soc. Sci. Econ. Res. 4, 3876–3886.

Organization, W.H., 2021. Ethics and governance of artificial intelligence for health: WHO guidance.

Qureshi, S., 2020. Why data matters for development? Exploring data justice, micro-entrepreneurship, mobile money and financial inclusion. Inf. Technol. Dev.

Steen, M., Timan, T., van de Poel, I., 2021. Responsible innovation, anticipation and responsiveness: case studies of algorithms in decision support in justice and security, and an exploration of potential, unintended, undesirable, higher-order effects. AI Ethics 1, 501–515.

Stilgoe, J., Owen, R., Macnaghten, P., 2013. Developing a framework for responsible innovation. Res. Policy 42, 1568–1580.

Ugwudike, P., 2022. Predictive algorithms in justice systems and the limits of tech-reformism. Int. J. Crime Justice Soc. Democr. 11, 85–99.

Info-slide education and 'Trojan journalism'
Encouraging young people's political participation on social media

Gabriel Malli[1], Robert Gutounig[1], Eva Goldgruber[1]

[1]Insitute of Journalism and Digital Media, FH JOANNEUM - University of Applied Sciences, Graz, Austria

Abstract. In conceptions of deliberative democracy, journalism is considered to play a crucial role in facilitating political participation. As social media platforms have become a preferred space for young people to inform and express themselves politically, journalistic actors are forced to use these spaces to reach young audiences and encourage participation. This study examines two journalistic social media accounts— *die_chefredaktion* on Instagram and *wien.stabil* on TikTok— that are dedicated to political reporting for young audiences. Through qualitative content analysis, recurring formats, topics and mediation styles were identified that target younger audiences beyond traditional media channels. The analysis reveals two mediation models used by these accounts, influenced by the conventions of the platforms. *Die_chefredaktion* makes young people's subjective concerns about current political issues the starting point for critical debates. 'Info-slides' and explanatory videos are intended to enable the audience to identify with and show solidarity with those affected by social problems. Special attention is given to the problems of (post-)migrant youth, which is also reflected in the diversity of the reporters. Instead, *wien.stabil* adopts a more indirect 'Trojan journalism' approach by embedding short journalistic videos within entertaining content, subtly encouraging political participation. An analysis of their formats and styles shows how they use different approaches to raise political awareness among their audiences.

1 Introduction

'The editorial teams are white, autochthonous, and educated bourgeois. [...] The young, diverse target group is hardly reached [...] because nothing changes in the structures.' (die_chefredaktion, 2021b) With these words, the Viennese journalist Melisa Erkurt opened the media project *die_chefredaktion* in an Instagram story in 2021. The ambitious project wants nothing less than to create new structures in the media industry by involving young people and addressing their interests and problems. It is thus part of a small but growing field of journalistic social media projects that build on the participation of young

people. They seek to provide their recipients with knowledge that can later become the basis for political practice. However, unlike forms of journalism run by untrained 'citizen journalists' (Clark and Marchi, 2017), these new channels are initiated and accompanied by experienced players in the media industry.

This paper takes a closer look at the hitherto under-researched phenomenon of participatory, yet professionalised social media journalism that targets at young audiences (see Mellado, 2022, for an overview on social media journalism): Based on a comparative content analysis of the posts of two Austrian channels - the aforementioned *die_chefredaktion* and the TikTok format *wien.stabil* - we reconstruct the journalistic strategies that emerge in the productions of this field. To this end, the following questions will be answered for each of the two channels:

1. Who are the protagonists of the contributions?
2. What are the thematic emphases?
3. Which platform-specific genre conventions are taken up?
4. Which aesthetic, rhetorical or affective styles of mediation are employed?

On the basis of these questions, we will show that two types of journalistic mediation in social media can be identified in the material, namely 'info-slide education' and 'Trojan journalism'. Starting with a discussion of ideals and problematisations in the context of youth political and journalistic participation in section (2), the case selection and methodological approach are elaborated in section (3). Finally, section (4) presents the case studies on the selected channels, while section (5) concludes with a comparison of the results.

2 Context: Political participation, journalism, and young people

While political participation is originally an analytical concept that encompasses various forms of involvement in processes of political will formation and decision-making (Geißel and Penrose, 2003, p. 3), normative political theories regard it as an ideal: in conceptions of deliberative democracy, political participation represents a central value that offers citizens opportunities for development and self-realisation (van Deth, 2009, p. 141). Journalism plays a key role in such theories: As a 'regulator and moderator of public discourse' (Hermida *et al.*, 2012, p. 816), truthful information should be made available to citizens as a basis for participatory practices and rational political decision-making (Welker, 2016, pp. 391–392).

Thus, journalism should constitute a public sphere in which citizens are encouraged to participate and discursive conflict resolution becomes possible (Habermas, 2004). Against the backdrop of a crisis of representative democracies and the decline of

traditional parties and interest groups in contemporary post-industrial societies (cf. Amlinger, 2022, pp. 95–130), the demand for political participation gains further relevance. Individual citizens are increasingly invoked as participating subjects who should feel responsible for shaping their social and institutional environment (Junge, 2008, p. 209). For the case of Austria this is evidenced by detailed public guidelines for civic participation (*Partizipation. Gemeinsam einsetzen und gestalten*, 2023) as well as research on the question of how participation can be fostered (Bischoff *et al.*, 2016).

At the same time, authors describe a 'crisis of journalism' in Western liberal democracies (Schneider, 2012). This refers primarily to the loss of audiences and monetisation opportunities of historically grown, professionalised print and TV journalism due to increasing competition from internet-based media. At the same time, actors without journalistic training are taking over services on the Internet that were traditionally considered to be the task of journalism. They disseminate information, initiate debates and contribute to the formation of political will. While such trends were discussed in terms of their democratic potential in the early days of the internet age (Lindgren, 2017, p. 150), concerns about the dangers they pose to democracies have begun to grow, as the debates on fake news, filter bubbles and 'alternative facts' suggest (Tucker *et al.*, 2018).

In short, a growing demand for participation contrasts with a loss of relevance of old journalism and a fragmentation of spaces for dialogue. This is particularly true for young people: Legacy media are struggling to reach younger audiences (Galan *et al.*, 2019) while new forms of non-professionalised journalism are emerging on the social web (Boulianne and Theocharis, 2020). For example, researchers describe a web-based, non-institutionalised 'connective journalism' (Marchi and Clark, 2021), in which young people report on political issues from the bottom up, based on their own affectedness. At the same time, 'para-journalistic' actors such as influencers are gaining in influence and reach (Hanusch and Löhmann, 2022). These trends are also evident in the case of Austria, where a growing importance of social media for political information among young people is reported, accompanied by a fragmentation of media publics (Ajanović, Fritsch and Zahorka, 2021).

These changed conditions force classical journalistic actors and media companies to adapt their offerings to interests and usage habits of a young audience (Hase, Boczek and Scharkow, 2022). The normative claim to create a public sphere and provide a basis for political participation no longer seems feasible within traditional channels. Not least, economic success depends on the extent to which young people can be addressed through new formats and integrated into the media business. Thus, professional journalists are moving into a field of 'non-conventional' journalism, adopting, adapting and institutionalising its genres, formats, and themes (Hermida and Mellado, 2020; Hendrickx, 2021).

3 Cases and method

3.1 Case selection

Our analysis follows on from this and reconstructs mediation modes of two Austrian journalistic social media formats that are dedicated to political reporting for a young audience. We selected two channels from Austria, *die_chefredaktion* and *wien.stabil*, both of which use TikTok and Instagram. According to their creators, both were founded with the aim of redesigning political journalism for a young audience, involving 'young people' in the content creation. Based on the findings that traditional media formats are 'too far from the everyday lives of young people' (die_chefredaktion, 2021a) and that journalistic communication of political content needs a 'contemporary form' ('Digitalverlag "hashtag": Stefan Apfl stellt neue journalistische TikTok-Show vor', 2022), they provide young actors with publicity, resources, and know-how to communicate political content to their audiences. This participatory approach makes them pioneers in Austria and sets them apart from older online offerings from legacy media.

At the same time, both channels are supported by experienced players from the Austrian media scene: Stefan Apfl, the founder of *wien.stabil*, was previously editor-in-chief of an Austrian investigative magazine. Melisa Erkurt, the founder of *die_chefredaktion*, wrote highly regarded reports for a Viennese migrant magazine and appeared as a public expert on migrant youth. The formats are also integrated into a network of Austrian media companies. Both can draw on journalistic know-how and professional technical resources. There are also links to people and organisations close to the Austrian social democratic movement. The cooperative *Bloomedia*, which provides services for journalists and is supported by pro-union actors, owns 50% of the media publisher *hashtag.jetzt*, which produces *wien.stabil* (Mark, 2021). The productions of *die_chefredaktion*, on the other hand, include numerous cooperations with the Chamber of Labour, a social democrat-dominated interest group representing employees (die_chefredaktion, 2022a). In this respect, at least individual productions can also be read as 'vehicles' of the social democratic movement to place political messages in a youth target group.

3.2 Empirical approach

Alongside these similarities, there are also differences in the forms of mediation. The analysis starts here and, by contrasting the cases, works out how the channels use platform conventions and media practices in different ways to create attractive products for young people and to stimulate political participation. In each case, the focus was on the main medium of the two channels: the Instagram account of *die_chefredaktion* and

the TikTok account of *wien.stabil*. We created a corpus of material that includes all permanent postings of the pages published between 20 September 2022 (the launch of *wien.stabil*) and 31 January 2023. The restriction of the research period reflects the synchronic conception of our analysis: the aim is not to trace temporal changes in content and modes of mediation, but to reconstruct these aspects comparatively in a limited period of time in order to gain insights into their systematicity (Diaz-Bone, 2010, p. 193). A total of 115 contributions were published during this period, 46 by *die_chefredaktion* and 69 by *wien.stabil*.

Based on the research questions, we defined three dimensions of analysis, which can be roughly described as the *who*, the *what* and the *how* of the productions. Firstly, we looked at who the presenters or authors of each contribution were. Secondly, we looked at the formats used, and the topics covered in the programmes. Thirdly, we looked at how the topics were presented stylistically and aesthetically to the audience. These three aspects acted as the main categories and comparative dimensions that made visible the differences between the productions, while also considering the platform logics reflected in the productions.

We began by writing focused summaries of each production, noting information about speaker positions, genre conventions, content, and audiovisual design. We then coded the material according to the main categories, based on concepts of qualitative content analysis (Kuckartz, 2018). Subsequently, inductive subcategories were developed, taking into account different classes of formats, speakers, contents and mediation styles. The categories were constantly compared with each other to draw attention to similarities and differences. Finally, the characteristics of the channels were condensed into two types, each specifying a mode of political journalism and activation in the context of social media (Kelle and Kluge, 2010).

4 Case Studies

4.1 *Die_chefredaktion* (Instagram)

die_chefredaktion, an editorially independent offshoot of the Viennese migrant magazine *der Biber*, has over 32,000 subscribers on Instagram and operates a TikTok channel as well as a paid newsletter. By offering workshops and scholarships, the project itself explicitly aims to provide young people without a professional background with resources for the journalistic preparation of political content. The project's emphasis on diversity is striking. Reporters, presenters and interviewees often come from a migrant background; the majority of presenters during the research period were women. This creates a further

potential for promoting participation. By presenting young and diverse people as politically active subjects, 'role models' are offered to the audience. In their performances, the producers present an ideal of self-confident and critical migrant youth that can become a basis for the recipients' political self-understanding. It thus fits into a growing field of initiatives that aim to make young people with a migration background visible in the media industry. Further examples from the German context are the network *Neue Deutsche Medienmacher*innen* (New German Media Makers), which offers mentoring for young journalists with an 'international history' (*Guter Journalismus ist vielfältig*, 2023), or the YouTube channel *datteltäter*, which deals with the problems of young German Muslims from a satirical perspective (*Datteltäter*, 2023).

4.1.1 Formats

Our analysis identified four key formats in the sample:

Documentaries: Journalistic documentaries of about five minutes on a specific topic are central to the channel's content. Beginning with a short introduction, young people affected by the topic, but also scientific, journalistic or activist experts are given the opportunity to speak. In most cases, the reporters also examine the political context and provide critical analysis.

Explanatory reels: Lasting no more than one minute, these shorter videos take up current issues, summarise them and discuss them critically, with the speakers appearing in the picture and additional text and image material being superimposed. While the documentaries aim for a more comprehensive presentation, this format can be interpreted as an attempt to put news into a form that can be easily integrated into social media use processes.

Info posts: So-called 'info posts' are another format typical of Instagram: In contrast to the video formats discussed so far, they are a series of text-heavy individual slides that users can navigate independently ('swipe') and in which information on a topic is shared. Info posts can also take the form of 'testimonials', in which authors provide personal references to issues.

Street interviews: Finally, the contributions also include recordings of street interviews with passers-by or participants in demonstrations, which is a typical format of digital social journalism.

In summary, we can speak of 'hybrid' products: There is a basic orientation towards journalistic genres, but they are flexibly adapted to the conventions and possibilities of Instagram (Hermida and Mellado, 2020). This can be read as a strategy to adapt to the expectations and consumption habits of a potential audience to remain competitive in the 'attention economy' of social media.

4.1.2 Thematic areas

The following thematic emphases emerged in the analysed postings of *die_chefredaktion*:

<u>Migration and integration</u>: Many productions focus on migration and integration. On the one hand, there are productions about refugees. A documentary from January 2023, for example, deals with the situation in a refugee camp in Bosnia and Herzegovina, with a critical political contextualisation that emphasises the responsibility of the Austrian government. On the other hand, the living conditions of people with a (post-)migrant background in Austria will be addressed. In addition to reports on migrant support organisations and interviews with migration researchers, *die_chefredaktion* publishes contributions on racism and forms of discrimination in everyday and institutional contexts. Many posts also deal with the identity formation of people with (post-)migration biographies.

<u>Socio-economic problems</u>: Another thematic complex deals with socio-economic problems, such as the current inflation, gentrification, labour disputes in the health sector and distributional inequalities. It is often emphasized that migrant people and women are particularly affected by these problems. One documentary, for example, reports on the difficulties of precarious migrant persons to break into academia and the arts.

<u>Mental health</u> is a recurring theme. In one documentary, young people describe the psychological effects of the COVID-19 pandemic; in another post, offers of help are presented. In addition, the (critical) examination of body norms is a frequent topic, especially in 'info slides'. The patriarchal constitution of such norms is highlighted, which underlines the feminist claim of the productions.

<u>Pop and web cultural phenomena</u> are also frequently discussed in the productions, with the producers taking a critical stance. For example, there is an 'info post' contribution in which the publications of TikToker and animal rights activist 'Die Militante Veganerin' (The Militant Vegan), which went viral at the time, are criticised for their discriminatory subtext. Finally, international political developments are discussed, with the Iranian uprising being a central theme during the research period. Figure 1 provides an overview of the content subcategories developed from the material.

Figure 1: Content-related subcategories of case study 1 by frequency: *die_chefredaktion*

4.1.3 Modes of Mediation

Regarding the overarching mediation styles of *die_chefredaktion,* we identified a break with norms of journalistic objectivity. While in a traditional understanding the abstraction of the journalist from the story and a 'balanced reporting' are seen as ideals (Blaagaard, 2013), many contributions focus on subjective concerns and emotionalisations of those reporting. This can be seen in Figure 2 where an author with Iranian roots describes her feelings about the Iranian uprising in 2022.
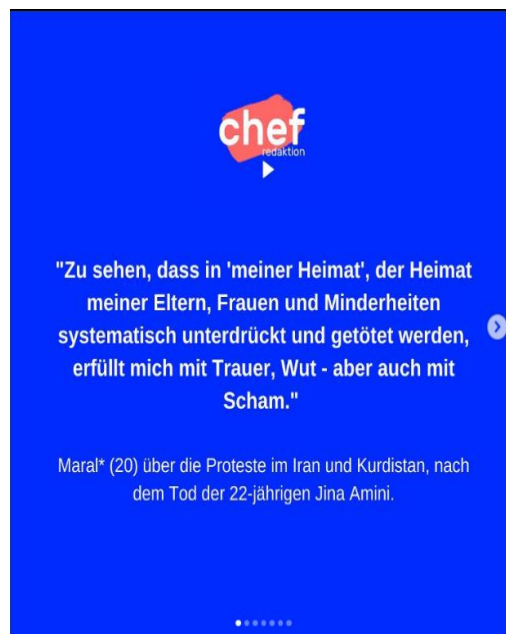
Figure 2: 'Seeing that in "my homeland", the homeland of my parents, women and minorities are systematically oppressed and killed fills me with sadness, anger - but also shame.' - First info slide on a post on the Iran uprising, written by an author with Iranian roots (die_chefredaktion, 2022b).

Similarly, it is BPoCs who report on the hurtful nature of racism, those affected by health restrictions who describe their suffering, or participants in demonstrations who explain their motives. With Clark and Marchi (2017), we can speak here of a professionalised variant of 'connective journalism' that puts personal emotions and narrations at the centre. This also marks a break with ideals of emotional detachment and sometimes even takes the form of 'confessional journalism' in which own weaknesses and fears are addressed in a self-exposing way (Coward, 2013).

However, descriptions of subjective consternations are never presented in an individualised way, but placed in political, economic, and socio-cultural contexts. This is evident, for example, in a video in which BPoCs describe experiences of structural racism in their everyday lives. Acts such as touching their hair or constant questions about their origin are problematised, while the recipients are explicitly asked to reflect on their behaviour. The goal here is to raise critical awareness of racism and solidarity with victims among bystanders. Other info posts exhibit similar patterns of social critique grounded in subjective experiences of racism, classism, ableism, sexism, or queer hostility.

In doing so, the productions unfold an (implicit) pedagogy that we call, in reference to one of the dominant formats, 'info-slide education'. On the one hand, they can offer a potential of identification for similarly affected recipients and open up critical horizons: they place subjectively painful experiences in a broad socio-political context and thus make it possible to develop a critical awareness of one's own social situation. On the other hand, they can give viewers who are not directly affected an impression of various problems, and the resulting suffering. Authentic reports can make problems tangible and give them a face, which in turn contributes to the emotional plausibility of their criticism. Through the representation of subjective concerns, recipients are informed about the political and social conditions of a problem that is to become the object of criticism. In this way, a political (self-)awareness can be promoted, which can become the starting point for further participatory practices.

4.2 *wien.stabil* (TikTok)

With around 27,000 followers and 441,000 likes (February 2023) on the TikTok platform, the channel *wien.stabil*, founded in September 2022, has quickly achieved a high reach. They also have an Instagram account with a lower reach. According to the self-description, the channel is a 'journalistic entertainment show'. Its content mainly consists of street interviews and short reports by young reporters, often addressing current political debates, but also offering a significant amount of pure 'entertainment'. It is part of a wider network of channels on various social media platforms run by the media publisher *hashtag.jetzt*. Similar to *die_chefredaktion*, *wien.stabil* is inspired by the 'funk'

network of the German public broadcasters ARD and ZDF and, as its initiator Stefan Apfl describes it, strives for 'Trojan journalism" (Plaikner, 2022). The publishing house is dedicated to developing 'journalistic digital formats with ambition' for young target groups. Cooperations with partners from the public and private sector are to secure the financing. *Wien.stabil* has a fixed team of presenters, most of whom are young, with a roughly equal number of male and female presenters. However, there is little evidence of a strong emphasis on diversity, either in the team or in the selection of interviewees. In summary, the term "Trojan journalism", as described by its initiator Stefan Apfl, can indeed be applied, in the sense that pure entertainment formats are mixed with the dissemination of knowledge and political or civic issues.

4.2.1 Formats

The formats chosen are strongly influenced by the characteristics of the platform. Videos are often short, under one minute, with rapid cuts and often enhanced with effects. In our analysis, we identified the following key formats in the sample.

Explanatory videos: Contributions on topical, often political issues or economic terms (e.g., 'inflation'), usually presented by a dedicated host for this format.

Series formats: Are also often used, e.g., to introduce political candidates for the presidential election in Austria in 2022. Over the course of just over a month, videos of similar structure were uploaded, each introducing a candidate, inviting people to vote, or providing further analysis.

Street interviews: This is a common journalistic tool, probably because it is easy to do with limited resources. Interviews are usually about current political issues or current events with people on the street in an urban context.

Expert interviews: Traditional interviews with experts, such as a lawyer discussing civil rights, are also included, typically edited into short answer snippets that follow media and platform conventions.

District tours or call-in-sessions: These are often produced as a live stream, then later published as edited posts.

Sketches, challenges & pranks: These include prank calls as well as challenges that prioritize the playful aspect.

In summary, these products can also be described as 'hybrid'. A basic tendency towards journalistic genres is flexibly adapted to the conventions and functionalities of TikTok. This can be interpreted as a tactic to adapt to the expectations and browsing habits of a potential audience on this specific platform.

4.2.2 Thematic areas

The range of topics is broad, with a focus on topical issues (see Figure 3).

Political issues: These have received considerable attention, with a particular focus on the Austrian presidential election that took place during the research period.

Contributions related to the COVID-19: Due to the observation period, topics related to the pandemic are predominant. However, this topic is approached with levity, such as through prank calls.

Economic issues were also addressed. This is highlighted by tops such as inflation.

Sports-related content was observed during the observation period. This was dominated by the Football World Cup which took place at the same time and was critically assessed. This topic is dealt with in the form of a series on the economic background of the World Cup.

Historical contributions often have a political connection (e.g., explanatory video on the true background of the National Day of Celebration in Austria.).

Family and relationships: Personal issues were also addressed. For example, represented by a video featuring a call-in viewer tells the story of how she was motivated to find her biological father after watching a previous caller on wien.stabil.

Figure 3: Thematic codes of case study 2 by frequency: *wien.stabil*

4.2.3 Modes of Mediation

The *wien.stabil* channel is more in line with TikTok-specific viewing habits. Explanatory videos are frequently employed, typically accompanied by decorative infographics that offer little explanation. Original audio clips, mostly taken out of context (e.g. from politicians), are used. The accusation often levelled at television images that they arbitrarily string together images from different contexts (and thus take them out of context) is taken to the extreme here.

Production conditions are likely to drive other format decisions: Street interviews are easy to conduct and, combined with the deliberate selection of audio clips, can quickly generate laughter. The best way to combine journalistic standards with platform-specific entertainment is through well-researched but quickly edited montage videos, such as a series on the Austrian presidential election. This shows the consistent 'internet logic' of the content, with each segment starting with a web search, followed by a rapid succession of audio and video snippets and images, often sarcastically commented on with internet memes (see Figure 4). What does not seem to have been abandoned here is a critical and investigative approach to journalism, evident in the critical questioning of each candidate's campaign priorities. In addition, comedy or sketch formats are typical of the platform, where even serious topics such as COVID-19 are treated as pranks.

Figure 4: Screenshot of contributions regarding the presidential elections in Austria on *wien.stabil* (wien.stabil, 2022; *person made unrecognisable afterwards*)

126

5 Conclusion and outlook

Although both channels are committed to participatory social media journalism for young people and are embedded in the structures of media companies, the comparison reveals significant differences: First, there are differences in terms of the actors and topics. The focus on diversity and migration issues clearly distinguishes *die_chefredaktion* from *wien.stabil*. This is already inherent in the concept of *die_chefredaktion*, which wants to reach out to a special target group of young people. This focus and the underlying understanding of journalism result not least from the biographical dispositions of the founder: Melisa Erkurt herself has Bosnian roots and worked as a teacher in Vienna before embarking on a career in journalism. Secondly, there are differences in the formats of the posts, which not least reflect the divergent platform logics of Instagram and TikTok. In the case of *wien.stabil*, the complete absence of text-heavy posts is striking.

Thirdly, the two case studies represent different approaches to how journalistic content can be mediated in social media against the backdrop of changing communication conditions. 'Info-slide education' (case study 1) is a form of journalism on social media that appeals to young people through the self-representation of peers who are affected by current political issues. Reminiscent of more recent forms of 'connective journalism', the subjective starting point of the reporting is made transparent, and affectedness is revealed. In doing so, the productions unfold an implicit pedagogy that may foster processes of identification and solidarization among the audience.

In the case of 'Trojan journalism', producers are trying to reach a young audience with political or economic issues through various entertainment formats. Although the journalistic presentations are based on classic journalistic approaches such as topicality or investigative research, they are always embedded in an entertainment programme that does not shy away from 'shallow' content. While the educational approach is clear in case study 1, it is more hidden in case study 2. Serious political-journalistic offerings thus represent, in a sense, the Trojans that hide in a horse of platform-typical, apolitical contributions and subsequently infiltrate the feeds of potential users. This reflects a pedagogical principle that assumes that political education and activation can be more successful if it is 'dressed up' in apolitical entertainment. Corresponding to these differences is a divergence in affective styles: 'info-slide education' shows a certain level of seriousness or consternation, while 'Trojan journalism' presents itself with a degree of playfulness.

Whether the accounts are actually able to generate political awareness and encourage participation cannot be assessed conclusively at this point. Both accounts have a remarkable reach, and a look at the comment sections suggests that their content is perceived and taken seriously by the target audience. However, a detailed study of reception practices remains a desideratum for future research.

Acknowledgements

References

Ajanović, E., Fritsch, K. and Zahorka, F. (2021) 'Digital verbunden Formen politischer Partizipation von Jugendlichen in Niederösterreich'. Available at: https://doi.org/10.15203/MOMENTUMQUARTERLY.VOL10.NO2.P66-84.

Amlinger, C. (2022) Gekränkte Freiheit: Aspekte des libertären Autoritarismus. Erste Auflage, Originalausgabe. Berlin: Suhrkamp.

Bischoff, U. et al. (2016) 'Einmischen, mitmischen, aufmischen – Partizipation in und durch politische(r) Bildung', in J. Tremmel and M. Rutsche (eds) Politische Beteiligung junger Menschen. Wiesbaden: Springer Fachmedien Wiesbaden, pp. 49–74. Available at: https://doi.org/10.1007/978-3-658-10186-2_4.

Blaagaard, B.B. (2013) 'Shifting boundaries: Objectivity, citizen journalism and tomorrow's journalists', Journalism, 14(8), pp. 1076–1090. Available at: https://doi.org/10.1177/1464884912469081.

Boulianne, S. and Theocharis, Y. (2020) 'Young People, Digital Media, and Engagement: A Meta-Analysis of Research', Social Science Computer Review, 38(2), pp. 111–127. Available at: https://doi.org/10.1177/0894439318814190.

Clark, L.S. and Marchi, R. (2017) Young People and the Future of News: Social Media and the Rise of Connective Journalism. Cambridge University Press. Available at: https://doi.org/10.1017/9781108116015.

Coward, R. (2013) Speaking personally: the rise of subjective and confessional journalism. Houndmills, Basingstoke, Hampshire ; New York, NY: Palgrave Macmillan (Journalism: reflections on practice).

Datteltäter (2023) funk.net. Available at: https://www.funk.net/channel/datteltaeter-814 (Accessed: 9 June 2023).

van Deth, J.W. (2009) 'Politische Partizipation', in V. Kaina and A. Römmele (eds) Politische Soziologie. Wiesbaden: VS Verlag für Sozialwissenschaften, pp. 141–161. Available at: https://doi.org/10.1007/978-3-531-91422-0_6.

Diaz-Bone, R. (2010) Kulturwelt, Diskurs und Lebensstil. Wiesbaden: VS Verlag für Sozialwissenschaften. Available at: https://doi.org/10.1007/978-3-531-91940-9.

die_chefredaktion (2021a) 'Die Chefredaktion auf Instagram', die_chefredaktion. Available at: https://www.instagram.com/p/CKhiDHMshUn/ (Accessed: 7 June 2023).

die_chefredaktion (2021b) 'über uns'. Available at: https://www.instagram.com/stories/highlights/17853960503467574/ (Accessed: 7 June 2023).

die_chefredaktion (2022a) 'Die Chefredaktion auf Instagram: "Hier sind 5 Tipps, die wir vorm Studienbeginn gern gewusst hätten', Instagram, 2 October. Available at: https://www.instagram.com/reel/CjOAiQWu_rf/ (Accessed: 8 September 2023).

die_chefredaktion (2022b) 'Zu sehen, dass in meiner Heimat, der Heimat meiner Eltern, Frauen und Minderheiten systematisch unterdrückt und getötet werden, erfüllt mich mit Trauer, Wut - aber auch mit Scham.', die_chefredaktion, 22 September. Available at: https://www.instagram.com/p/Ci0CJEesoyT/ (Accessed: 7 June 2023).

'Digitalverlag "hashtag": Stefan Apfl stellt neue journalistische TikTok-Show vor' (2022) Horizont, 11 October. Available at: https://www.horizont.at/digital/news/digitalverlag-hashtag-stefan-apfl-stellt-neue-journalistische-tiktok-show-vor-89577 (Accessed: 7 June 2023).

Galan, L. et al. (2019) How young people consume news and the implications for mainstream media. Report. Reuters Institute for the Study of Journalism. Available at: https://apo.org.au/node/256781 (Accessed: 8 September 2023).

Geißel, B. and Penrose, V. (2003) 'Dynamiken der politischen Partizipation und Partizipationsforschung - Politische Partizipation von Frauen und Männern.', gender...politik...online, pp. 1–30.

Guter Journalismus ist vielfältig (2023) neuemedienmacher.de. Available at: https://neuemedienmacher.de/ (Accessed: 9 June 2023).

Habermas, J. (2004) 'Discourse Ethics', in H. Gensler, E. Spurgin, and J. Swindal (eds) Ethics: Contemporary Readings. New York and London: Routledge, pp. 146–152.

Hanusch, F. and Löhmann, K. (2022) 'Dimensions of Peripherality in Journalism: A Typology for Studying New Actors in the Journalistic Field', Digital Journalism, pp. 1–19. Available at: https://doi.org/10.1080/21670811.2022.2148549.

Hase, V., Boczek, K. and Scharkow, M. (2022) 'Adapting to Affordances and Audiences? A Cross-Platform, Multi-Modal Analysis of the Platformization of News on Facebook, Instagram, TikTok, and Twitter', Digital Journalism, pp. 1–22. Available at: https://doi.org/10.1080/21670811.2022.2128389.

Hendrickx, J. (2021) 'The Rise of Social Journalism: An Explorative Case Study of a Youth-oriented Instagram News Account', Journalism Practice, pp. 1–16. Available at: https://doi.org/10.1080/17512786.2021.2012500.

Hermida, A. et al. (2012) 'SHARE, LIKE, RECOMMEND: Decoding the social media news consumer', Journalism Studies, 13(5–6), pp. 815–824. Available at: https://doi.org/10.1080/1461670X.2012.664430.

Hermida, A. and Mellado, C. (2020) 'Dimensions of Social Media Logics: Mapping Forms of Journalistic Norms and Practices on Twitter and Instagram', Digital Journalism, 8(7), pp. 864–884. Available at: https://doi.org/10.1080/21670811.2020.1805779.

Junge, T. (2008) Gouvernementalität der Wissensgesellschaft: Politik und Subjektivität unter dem Regime des Wissens. transcript Verlag. Available at: https://doi.org/10.1515/9783839409572.

Kelle, U. and Kluge, S. (2010) Vom Einzelfall zum Typus: Fallvergleich und Fallkontrastierung in der qualitativen Sozialforschung. 2., überarbeitete Auflage. Wiesbaden: VS Verlag (Qualitative Sozialforschung, Band 15).

Kuckartz, U. (2018) Qualitative Inhaltsanalyse. Methoden, Praxis, Computerunterstützung. 4., überarbeitete. Weinheim Basel: Beltz Juventa.

Lindgren, S. (2017) Digital media & society. London ; Thousand Oaks, California: SAGE Publications Ltd.

Marchi, R. and Clark, L.S. (2021) 'Social media and connective journalism: The formation of counterpublics and youth civic participation', Journalism, 22(2), pp. 285–302. Available at: https://doi.org/10.1177/1464884918807811.

Mark, O. (2021) 'Hashtag: Ex-"Datum"-Chefredakteur Apfl gründet Digitalverlag für Journalismus', DER STANDARD, 20 January. Available at: https://www.derstandard.at/story/2000123415835/hashtag-ex-datum-chefredakteur-apfl-gruendet-digitalverlag-fuer-journalismus (Accessed: 9 June 2023).

Mellado, C. (2022) 'Digital Journalistic Cultures on Social Media', in The Routledge Companion to News and Journalism. 2nd edn. Routledge.

Partizipation. Gemeinsam einsetzen und gestalten (2023). Available at: https://partizipation.at/ (Accessed: 6 June 2023).

Plaikner, A. (2022) 'Stefan Apfl: Handyfernsehen für Junge. "Spielart von neuem Digitaljournalismus"', Österreichs Journalist:in, 36(6), p. 14.

Schneider, N. (2012) 'Krise der Medien, Krise des Journalismus, Krise der Demokratie?', in O. Jarren, M. Künzler, and M. Puppis (eds) Medienwandel oder Medienkrise? Nomos Verlagsgesellschaft mbH & Co. KG, pp. 25–34. Available at: https://doi.org/10.5771/9783845236735-25.

Tucker, J. et al. (2018) 'Social Media, Political Polarization, and Political Disinformation: A Review of the Scientific Literature', SSRN Electronic Journal [Preprint]. Available at: https://doi.org/10.2139/ssrn.3144139.

Welker, M. (2016) 'Journalismus als Inklusions- und Partizipationsleistung', in M. Löffelholz and L. Rothenberger (eds) Handbuch Journalismustheorien. Wiesbaden: Springer Fachmedien Wiesbaden, pp. 385–402. Available at: https://doi.org/10.1007/978-3-531-18966-6_23.

wien.stabil (2022) 'Die Qual der Wahl….. hier sind eure Kandidaten! Wir starten mit dem Titelverteidiger', TikTok, 28 September. Available at: https://www.tiktok.com/@wien.stabil (Accessed: 9 June 2023).

Pragmatic data craft: Conceptions of skillful data journalism between journalist values, scientific approaches, and economic boundaries

Gabriel Malli[1], Sonja Radkohl[1], Eva Goldgruber[1]

[1] Institute of Journalism and Digital Media, FH JOANNEUM - University of Applied Sciences, Graz, Austria

Abstract. Embedded in societal trends of datafication, data journalism is an emerging journalistic sector that has attracted attention in media studies. While previous research has often focused on workflows, practices and routines in data journalism, this paper investigates how data journalists position themselves in the field. Based on material from ten interviews with data journalists in the German-speaking world, I have identified knowledge forms, ideals and skills that the interviewees consider crucial for becoming a "good" data journalist. Data journalism is often associated with the ideal of a scientific way of doing journalism, with an investigative and emancipatory potential. At the same time, interviewees suggest that the work of data journalists is constrained by the economic pressures of the media industry. As interview partners indicate, navigating these tensions requires skills: In addition to general journalistic skills, interviewees stress the importance of skills related to the generation, selection and preparation of numerical (raw) data. Secondly, they mention the importance of analytical competences in transforming data into processed information. Finally, digital skills in presentation, visualisation and design are seen as essential for transforming technical information into stories that can be understood by general audiences. Although individual specialisations emerge, there is a common emphasis on applied technical knowledge: Pragmatic problem-solving competences in computer-assisted manipulation, analysis and presentation of data are at the heart of skilled data journalism. To be effective in a competitive environment, such capabilities are acquired autodidactically through learning-by-doing processes in a continuous sequence of interactions with digital tools.

1 Introduction

Data journalism as a genre has emerged since the 2000s, and is closely linked to broader social processes of digitisation and datification. In the broadest sense, those productions can be understood as 'data journalism' that use numerical data and statistical or social science methods to develop and/or ground journalistic stories (Coddington, 2015). Beyond these basic characteristics, data journalism presents itself as a fluid field (Stalph, 2020) in which journalistic, scientific and entrepreneurial norms and logics intertwine or compete, and the boundaries to neighbouring fields and professions are blurred. For example, there are overlaps with the broader field of computational journalism, which is concerned with the computerised and algorithmic distribution of media (Coddington, 2015). There are also intersections with the interdisciplinary data sciences, which have emerged in academia and are primarily concerned with methods for analysing large, digitally produced datasets (Heravi, 2019).

Just as the field is still fluid, what it means to be a data journalist is not clearly defined. Despite trends towards the institutionalisation of the profession, knowledge about the necessary skills and abilities that make a competent data journalist seems to be constantly negotiated (Haim, 2022). This paper takes up this point and explores how data journalists think about their profession. Based on ten interviews with data journalism trainers, it traces which practical skills, competences and forms of knowledge the interviewees consider crucial for good data journalism work. It also reconstructs how, from their perspective, these skills can be realised in an environment where journalistic values and economic constraints potentially conflict. As I show, the trainers interviewed consider practical and applied problem-solving knowledge about the skilful use of digital machines to be particularly important.

Starting with a brief discussion of previous research on data journalism, in the second section I develop a conceptual framework that understands data journalism as a subfield of the journalistic field. In the third section I specify my method, and in the fourth section I outline the tension between cultural norms and economic constraints that emerged in the interviewees' statements. In the fifth section, I discuss skills related to different work steps that the interviewees identified as relevant to the practice of data journalism, while in the conclusion I highlight key commonalities of the statements.

2 Conceptual Discussion: Data Journalism as a Practice Field

Especially since the 2010s, the number of scholarly publications on the phenomenon of data journalism has increased massively (Ausserhofer et al., 2020): In addition to publications that make application-oriented proposals for data journalism practice or training (e.g., Heravi, 2019), there are articles and monographs that examine the phenomenon in different national contexts from a media studies perspective. Four focuses of the research can be identified:

(1) Some studies focus on the typical content and formal design of data journalism (Knight, 2015; Tandoc and Oh, 2017; Stalph, 2018; Beiler et al., 2020), reconstructing the forms of visualisation and data presentation in data journalism stories. As it becomes clear, the efforts made by journalists vary considerably: Interactive and dynamic pieces contrast with those that are 'as much decorative as informative', as Knight (2015) soberly notes.

(2) In addition, studies have repeatedly looked at work processes in the context of data journalism. Through interviews with journalists, observations in work contexts or meta-analyses of existing studies, typical practices, routines and workflows of data journalism have been identified (Borges-Rey, 2016; Tong and Zuo. 2021; Gutounig et al., 2022). Drawing on concepts from actor-network theory, authors point to the specific socio-material arrangements that emerge in everyday interactions with data and data machines (Ausserhofer, 2015; Stalph, 2019; Hermida and Young, 2019).

(3) Furthermore, some research studies analyse the phenomenon of data journalism in its organisational, institutional and historical contexts: They consider the emergence of the field out of the crisis of classical journalism (Hermida and Young, 2019), shed light on the interrelationship between 'classical' and data-driven journalism in organisational contexts (Appelgren and Nygren, 2014; Borges-Rey, 2016), trace the emergence and institutionalisation of a data journalism field (Stalph, 2020; Weinacht and Spiller, 2022), and highlight the dependencies on government actors that produce data (Stalph, Hahn and Liewehr, 2022).

(4) Finally, the analysis of data journalists' values and self-image is a recurring element: Studies conclude that the control function of journalism is particularly emphasised among actors in the field (Weinacht and Spiller, 2014; 2022; Haim 2022). Similarly, the idea that data work enables more accurate and objective journalistic work is frequently found (Heravi and Lorenz, 2020; Tandoc and Oh, 2017). However, this claim is critically addressed by Tong and Tuo (2021), who point to various gateways of subjectivity in the concrete work process.

Following Stalph (2020), this article proposes a conceptual approach that integrates institutional, economic and cultural aspects of data journalism and considers data journalism as a (practice) field. Such a conception draws on the work of Pierre Bourdieu, who understands the social world as a system of relatively autonomous social fields (Bourdieu and Wacquant, 1992). A field is populated by actors who occupy positions based on their endowment with different forms of capital: Using the example of the journalistic field as described by Hanitzsch (2016), the quality press, located at the 'intellectual' pole of the field, is characterised by high cultural and relatively low economic capital, while the opposite is true for tabloid journalism, located at the commercial pole.

Journalistic fields are characterised by a certain doxa, a set of values and beliefs that are generally accepted as true and that define what 'legitimate' journalistic practice should look like (Schultz, 2007, p. 194). Objectivity, independence, newsworthiness and informing the public are classic journalistic values and goals that are hegemonic in the field, but at the commercial pole they mix with the economic logic of the entertainment industry and mass production. This can lead to symbolic struggles in the field, where processes of differentiation occur (Hanitzsch, 2016, p. 286) and questions of 'good' journalistic work, knowledge and practice are contested.

Data journalism can be understood as a subfield of the journalistic field (Stalph, 2020) with a proximity to the intellectual pole. However, it is characterised by tensions related to conflicts between internal and external values: Logics of the scientific field, from which data journalism takes its methods and tools, can become just as effective as journalistic and entrepreneurial logics (ibid., 66f). At the same time, data journalism is a "fluid" and differentiating field that is still in the process of formation. Accordingly, it seems obvious that the doxa of the sub-field as well as the questions of "good" data journalistic practice and the necessary competencies of a "skilled" data journalist are still under negotiation.

An empirical look at the field of data journalism in the German-speaking world confirms these considerations: As Weinacht and Spiller (2022) show on the basis of quantitative survey data, actors in the field assign themselves to different fields of activity. They do not see themselves exclusively as journalists, but sometimes also as programmers or graphic designers. The same study reports divergent professional self-images, suggesting different understandings of the field's doxa: The "analytical controller" accentuates the control function of data journalism for politics, business and society; the "fast mediator" emphasises the possibility of rapid information transfer; and the "neutral informant" stresses data journalism's ability to explain and communicate complex issues more precisely.

3 Methodological Approach

This is where this article comes in: It reconstructs conceptions of data journalism competencies in the self-reports of data journalists, but relies on qualitative methods. For this purpose, material from a total of ten expert interviews with German-speaking data journalists who also work as data journalism trainers was analysed. Of the ten interviewees, three were Austrian, three German and four Swiss, four were female and six male. Most of them are pioneers of data journalism in German-speaking countries who have been working in the field for some time. While half of them are trained journalists, the other five have different backgrounds, such as computer science, web design or statistics, which brought them to data journalism at some point in their careers.

The interviews were conducted in 2020 and 2021 as part of the SEVA (Self-Explanatory Visual Analytics for Data-Driven Insight Discovery) project. In general, this project aims to develop onboarding methods for visual analytics tools in data journalism and biomedical research. In particular, the interviews aimed at reconstructing the broader challenges of data journalism and training. However, as became clear during the analyses guided by open coding approaches of grounded theory (Corbin and Strauss, 2015), more general templates of a professional self-image emerged in the statements of the research subjects. On a meta-level, the interviews can thus be understood as discursive practices through which the speakers position themselves in a data journalism field and construct specific images of a 'competent' data journalist and his or her practical skills. Accordingly, it should be borne in mind that the interviews do not provide direct insights into actual practice, but must first be understood as self-reports that specify models of practice and workflows.

Also, the sample of ten respondents is admittedly limited and does not allow any definitive statements to be made about the structures of the field as a whole. Nevertheless, their specific role as trainers allows for insights that go beyond subjective interpretative knowledge: On the one hand, they are experienced experts in the field. In the course of their professional careers they have gained extensive insights into the development and institutionalisation of data journalism, which gives them a relatively formalised technical knowledge of the regular processes of data journalistic practice. Also, they have process knowledge that has been generated in actual courses of action (Bogner and Menz, 2002, p. 43).

On the other hand, in their role as educators, they have a gatekeeping function, which gives them a specific power in the field: in their work, they can influence the concrete positioning of new actors in the field; moreover, they make suggestions as to which skills are important and which requirement profiles should be set for young data journalists. In this way, they contribute to the institutionalisation and dissemination of a data journalist doxa and develop a specific professional understanding of a "competent" data journalist.

4 Data Journalism between Emancipatory Claims and Economic Pressure

In general, the interviews reveal a tension between the cultural and economic conditions of the field, which forms a ubiquitous basis for the requirement profiles and skills noted in the interviewees' statements. What is clear from the interviews is a commitment to 'classic' journalistic values, with an emphasis on objectivity and investigative components. Data journalism is seen as particularly suitable for the realisation of these values, as it can generate "more objective" knowledge and unfold a specific potential for enlightenment that can "provide orientation [...] for a broader public in the chaos of the world" (T2, see also T8).

Such statements express a self-positioning close to the intellectual pole of a journalistic field, but at the same time resonate distinctions to forms of non-data-based journalism described as "literary" (T1) or "anecdote-based" (T3). Working with numerical data is positively associated with the possibility of 'scientification' of journalism: this is expressed in descriptions of an ideal working process reminiscent of process models of quantifying and hypothesis-testing social research (T1, T2), whereby 'scientificity' is equated with a high degree of quantification (see also T8, cf. Heintz, 2007). Even if individual statements also refer to the danger of the manipulative potential of data processing (e.g. T3, T7) and acknowledge the influence of subjective interests on processes (T6), the conviction that numerical data can enable more "accurate" journalism that is more useful for educating the public seems to be essential for the self-image of many actors in the field.

However, these ideals of an objectifying and investigative data journalism are countered in the statements by descriptions of the empirical reality of the field, in which the economic logic of the media industry limits the actual possibilities of data journalistic practice. Time for investigation, research and analysis is central to the success of data journalism projects. However, as journalism is an industry that values the topicality and novelty of its products and subjects its actors to constant productivity pressure (Harro-Loit and Josephi, 2020), resources for data journalistic investigations, which are usually

time-consuming, are limited. Finally, the "scientificity" of the process may suffer from this lack of time: Ideal-typical processes based on linear scientific process models are often not feasible; instead, efficiency orientation and cost-benefit calculations are seen as necessary, as one statement from an interview transcript suggests:

"Another aspect is also such a return on investment. How can I make a good story as quickly as possible? That is also a relevant question for journalists who are under pressure: Is it worth it? Estimation of effort, does it make sense to put in so and so much effort, what could be the potential return from the story." (T6, author's translation)

Moreover, only larger media producers can afford to employ their own data journalists; often, despite their expertise, the interviewees do not work full-time in the field. According to their own statements, some of them are primarily involved in 'regular' journalistic activities, some work (additionally) in the field of information technology, and some have jobs in agencies - in any case, data journalism work is mostly carried out in teams that share the workload. However, as one interviewee points out, cross-company cooperation, such as often occurs in the context of research collectives, is rare in the industry, which he in turn attributes to increased competition. Restrictions can also arise in relation to certain instruments and programmes that are not (or cannot be) financed by smaller companies (T7). Here it becomes clear that economic constraints systematically limit options for action and provide a framework within which statements about skills and competences unfold.

5 Skills in the Circuit of Data Journalism

In terms of skills considered necessary, interviews generally point to the importance of journalistic skills that are not specific to the subfield of data journalism. These include research capacities (for example, how to find possible data sources) or the ability to find stories that appeal to audience interests. More central to the self-image of the interviewees, however, is the handling of data: According to the interviewees, data journalism is a field of practice in which data is generated, selected, processed, edited, and distributed using various techniques and technologies in order to make it accessible to a wider public in the form of journalistic texts and visualisations. With Prietl and Houben (2018, p. 16, own translation), it can be assumed that the production of and work with data implies a selective reduction of social reality, which implies 'numerical condensations of [...] characteristics, attitudes and events deemed relevant'. At the same time, actors in the field of data journalism transform these data through statistical operations into information, which in turn creates knowledge, and are thus involved in the production of social reality. Confronting these theoretical assumptions with the skills and

practice models identified in the interviewees' statements, it is possible to reconstruct an ideal-typical 'cycle model' of data journalism practice, each stage of which requires its own set of skills (Figure 1).
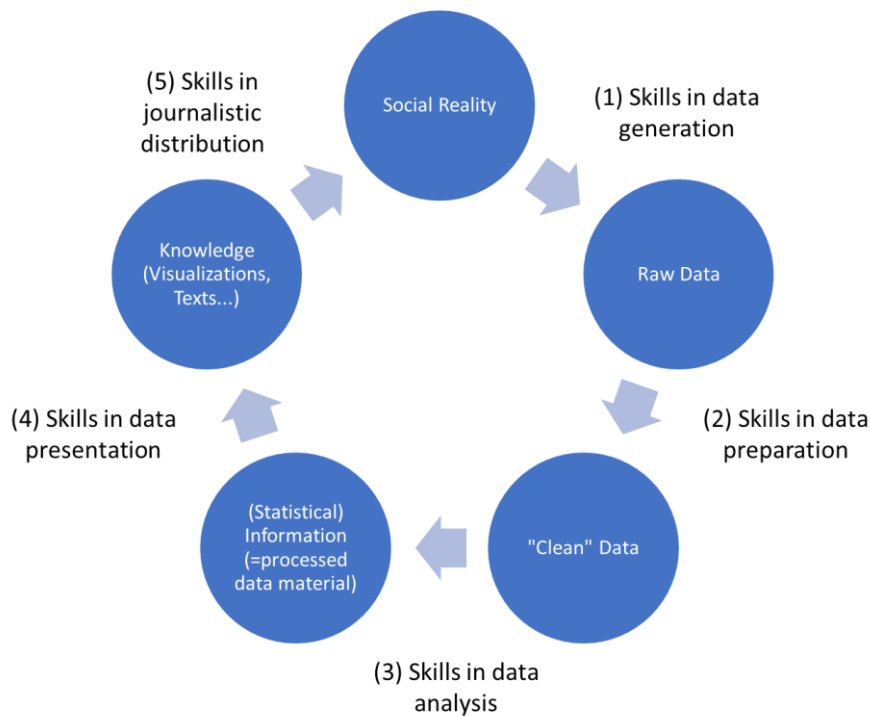
Figure 1: The Circuit of Data Journalism

Firstly, there are skills related to the production and acquisition of data material, involving the transformation of relevant empirical observations of social reality into numerical data material. This can take the form of 'data mining'. This involves the (mostly automated) 'scraping' or 'mining' of (raw) data from various (online) sources such as social media profiles, often requiring programming skills or knowledge of how to use appropriate tools (T1, T5, T9). Data can also be generated through self-administered surveys. While at least one interviewee had experience with self-generated surveys, this approach is not seen as a core competency of data journalism, nor is it taught in training courses. As one interviewee notes:

"Journalists don't know how to do it and they definitely don't do it right. [...] It's not without reason that there are people whose whole job is to figure it out, plan it, and execute it." (T8, see also T1, author's translation)

Accordingly, such steps are often outsourced from the field: Data journalists tend to rely on existing datasets from non-journalistic sources, such as those produced in the context of scientific or government statistics. However, the critical examination of such data sources is a key task.

Skills in preparing, exploring, cleaning and selecting data are at the heart of a second set of skills that came up repeatedly in the interviews and are also central components of the interviewees' training programmes. The available data must first be assessed for its 'usefulness' for potential projects. After the presuppositional process of importing the data into processing programmes, many interviewees report initial explorations to familiarise themselves with the possibilities and limitations of the available data, to 'interrogate' the data set (T5) and to identify possible topics for journalistic work, which requires a certain flexibility and creativity (see, for example, T8). Admittedly, such a procedure undermines the linear process of quantifying research, which chronologically places the selection of topics and the formulation of theoretically sound hypotheses before working with the data. In contrast, some statements emphasise the relevance of a 'feel' for data sets: However, what is meant is not so much an emotional relationship as a capacity for abstraction that allows the rapid identification of analytical possibilities as well as the recognition of 'interesting' patterns in the data through basic descriptive statistics and visualisation. This requires, on the one hand, the skilful use of computer programs and, on the other hand, a basic knowledge of statistical concepts.

Another essential aspect of 'data preparation' is cleaning, where the 'raw material' of data sets needs to be processed and optimised in a specific way in order to become usable as 'clean data' for further analyses. On the one hand, erroneous, inconsistent or duplicate data must be sorted out, and on the other hand, existing variables must be recoded to make them usable for further computational steps. In this context, a metaphor-rich language stands out: "bad" data must be "weeded out"; the "vegetables" must be removed (T6); variables must be "puzzled together" (T2); the raw data set is "poked around" and "tumbled" (T3). These haptic metaphors point to an image of data as material, with (digital) data work presented as mechanical and implicitly associated with manual skills. Similarly, the steps involved are almost unanimously portrayed as particularly labour-intensive by the interviewees, as can be seen in one interview:

"In practice, it is of course the case that you also have data sets where you need 5,000 manual steps at the beginning until they are even put into shape, until they are structured and completely machine-readable." (T2, author's translation)

In contrast to the subsequent fully automated computing process, which is also described in the interviews as "wizardry" (T3), the clean-up seems to be perceived as more 'manual' work. Subsequently, performing the actual data analysis is the third essential set of skills related to the transformation of data into information. Here, the interviewees mainly referred to formal "basic skills", which include simple mathematical operations, especially in the field of descriptive statistics. Some interviewees believe that basic skills are sufficient for the "day-to-day business" of data journalism and limit their training courses to teaching these skills. This can be seen, for example, in a statement from T8, in which

the interviewee expresses the opinion that the "statistics hype" is over and differentiates herself from scientific statistics:

"We describe that there is a pattern [...] but we have not proven by statistics that it is so. The goal is also something that can [...] still be communicated according to journalistic criteria. We are not doing total science now and then no one will understand it." (author's translation)

Corresponding views can also be found in other protocols that illustrate the tension between the field of data journalism and the field of scientific statistics. Although a methodological proximity between the two fields may be ideal, journalistic logics set limits, especially as stories need to remain understandable to a wider audience. Nevertheless, there are also statements that point to the potential of more complex statistical measures for data journalism, explicitly mentioning correlation and regression analysis.

However, formal mathematical knowledge seems to be subordinate to process knowledge about the selection and application of tools: In addition to basic statistical and computational programs such as *Excel* or *SPSS*, specialised tools such as *Darawrapper* that create visualisations or "mappings" are mentioned. While some respondents (e.g. T4) consider this to be a sufficient basis for the practice of data journalism, others believe that programming skills and knowledge of programming languages such as *R* or *Python* are necessary for good work, as the following statements show:

"I would say anyone who works as a data journalist for a long time will eventually reach limits with spreadsheets and then it needs programming skills." (T5, author's translation)

"So these super dedicated teams, [...] they don't actually use these tools. [...] They also have to actively distance themselves from the tools, so to speak, and say, 'we do things that these tools can't do yet.'" (T8, author's translation)

In these statements, a line of distinction within the field emerges: according to them, programming skills are a central competence of "good" or experienced data journalists, while working with tools characterises beginners to a certain extent.

The fourth set of skills concerns the transformation of technical information into knowledge that can be presented in a journalistic way and that can be absorbed by society: This involves preparing and presenting statistical analyses in the most accessible way. A key aspect of data presentation is the creation and use of visualisation techniques to help the audience understand complex numerical relationships. This is seen by respondents as a particularly effective way of communicating statistics and giving them legitimacy, while also addressing issues of design and aesthetic form. It is clear from the interviews that it takes a certain amount of sensitivity to design graphs in a reader-friendly way and to choose the form of presentation that best presents the facts of interest without being too complicated. This is evident in T10, for example, when the respondent states:

"I find this principle of 'form follows function' extremely important in the field of journalism. We don't do art. [...] My opinion is, that a graphic that I have to look at for more than ten seconds in order to understand it is a bad graphic in the field of journalism." (author's translation)

Accordingly, respondents show a preference for simple descriptive visualisations, such as bar and column charts, but also interactive maps. In this context, they speak of a specific "visualisation literacy" of the recipients, i.e. the competence to be able to interpret visualisations correctly, which has to be constantly anticipated by data journalists. This is a challenge, as becomes clear, for example, when T8 speaks of "operational blindness" in data journalism as a widespread problem. However, the boundaries to the previous set of skills are blurred here, especially as the tools intertwine the analysis of data sets and the visualisation of results. Going beyond the standardised forms of visualisation made possible by tools requires additional design skills, which in turn require mastery of specific programmes.

Again, writing skills are required: Analyses and their presentation in tabular or graphical form need to be embedded in texts and stories in order to become tangible for the audience. In addition to fully data-based stories, in which the data "speak for themselves" (T3), data preparation can also be used in a supportive way to increase the legitimacy of the respective articles and their arguments. However, as emphasised in T1, the story-telling with concrete protagonists is seen as essential for the audience success of data journalism:

"The data are sort of the basis of the story, so they're the core of the story. That doesn't mean they have to be the main part of the story. It means it's still about protagonists around storytelling, but data plays an important role in the story." (author's translation)

The fifth issue is the distribution of data journalism products, which need to be communicated to an audience in order to become part of the public discourse, develop their knowledge-generating power, and become profitable. Online publications seem to be the obvious choice here, but similar presentations can also be found in print formats. However, this is not the primary task of the data journalists interviewed, most of whom are integrated into media companies.

6 Conclusion: Journalism as Pragmatic Data Craft

As mentioned above, the interviewees set different emphases and priorities in their statements and training programmes, each reflecting their own positioning in the field or cycle of data journalism. What a competent data journalist needs to be able to do is therefore not fully defined. However, this is not surprising given the fluid nature of the field and its division of labour. Similarly, there is little evidence in the interviewees'

statements of demarcation processes and positional struggles in the field; at best, it can be assumed that programmers see themselves as a kind of tech-savvy avant-garde compared to data journalists who work with standardised tools.

Regardless of their own focus, however, it is noticeable in all interviews that it is less formalised technical knowledge than self-taught practical and application-related process knowledge that is described as relevant. This is necessary for all positions in the 'circuit', but seems to be particularly relevant for skills in data preparation, analysis and processing. The practice of data journalism does not appear to be a 'procedure by protocol', but in the descriptions is based on trial and error processes in which a practical, generalised competence to identify and solve problems is learned. This is reminiscent of broader findings that argue that data work is often based on improvisational practices that combine informal problem-solving knowledge with formal bodies of knowledge (Houben and Prietl 2018, p. 334). This is evident, for example, in a statement from I6, which notes:

"[It needs] of course the understanding of larger contexts, why you do it at all [...] and why it doesn't work or something. And that, unfortunately, also needs a lot of experience. So you have to have encountered errors before, so that you know in which direction you can look or that you develop some kind of meta-skill, how can I solve errors of a technical kind." (author's translation)

This is also a didactic principle in the training, as the interviewees emphasise in their descriptions: Participants are often provided with an erroneous raw data set which, after some basic instructions, is processed and evaluated in the sense of "learning by doing". As T1 makes clear, the training courses are primarily intended to enable participants to gain "experience". At the same time, this practical problem-solving knowledge always includes elements of human-machine interaction: the skilful use of material means is a constitutive part of data journalism practice. As already mentioned, a "craft" understanding emerges in the metaphors used: it is a matter of finding the right tool when needed to process the raw material - the data - as efficiently as possible.

Interestingly, the interviewees are less concerned with canonising specific skills, techniques and functions in the field of data journalism, but rather point to the centrality of practical and pragmatic 'meta-skills', which above all have to be learned and acquired autodidactically (see also Tong, 2022). What emerges is an overarching self-image of data journalism that places mastery of data and technology at the centre of the profession. This focus, one might conclude, serves not least to navigate tensions between journalistic demands and media economic imperatives, as well as to maintain agency against a backdrop of limited financial and time resources. Similarly, the emphasis on teaching efficient and applied skills reflects the challenge of meeting journalistic standards while managing scarce resources.

References

Appelgren, E., Nygren, G., 2014. Data Journalism in Sweden: Introducing new methods and genres of journalism into "old" organizations. Digital Journalism 2, 394–405. https://doi.org/10.1080/21670811.2014.884344

Ausserhofer, J., 2015. "Die Methode liegt im Code": Routinen und digitale Methoden im Datenjournalismus. https://doi.org/10.17174/DCR.V2.5

Ausserhofer, J., Gutounig, R., Oppermann, M., Matiasek, S., Goldgruber, E., 2020. The datafication of data journalism scholarship: Focal points, methods, and research propositions for the investigation of data-intensive newswork. Journalism 21, 950–973. https://doi.org/10.1177/1464884917700667

Beiler, M., Irmer, F., Breda, A., 2020. Data Journalism at German Newspapers and Public Broadcasters: A Quantitative Survey of Structures, Contents and Perceptions. Journalism Studies 21, 1571–1589. https://doi.org/10.1080/1461670X.2020.1772855

Bogner, A. (Ed.), 2002. Das Experteninterview: Theorie, Methode, Anwendung. Leske + Budrich, Opladen.

Borges-Rey, E., 2016. Unravelling Data Journalism: A study of data journalism practice in British newsrooms. Journalism Practice 10, 833–843. https://doi.org/10.1080/17512786.2016.1159921

Bourdieu, P., Wacquant, L.J.D., 1992. An invitation to reflexive sociology. University of Chicago Press, Chicago.

Coddington, M., 2015. Clarifying Journalism's Quantitative Turn: A typology for evaluating data journalism, computational journalism, and computer-assisted reporting. Digital Journalism 3, 331–348. https://doi.org/10.1080/21670811.2014.976400

Corbin, J.M., Strauss, A.L., 2015. Basics of qualitative research: techniques and procedures for developing grounded theory, Fourth edition. ed. SAGE, Los Angeles.

Gutounig, R., Radkohl, S., Goldgruber, E., Stoiber, C., 2022. Datenjournalismus: Die Transformation journalistischer Arbeitsabläufe und Produkte durch Visualisierung und Analyse von Daten, in: Alm, N., Murschetz, P.C., Weder, F., Friedrichsen, M. (Eds.), Die digitale Transformation der Medien. Springer Fachmedien Wiesbaden, Wiesbaden, pp. 325–345. https://doi.org/10.1007/978-3-658-36276-8_15

Haim, M., 2022. The German Data Journalist in 2021. Journalism Practice 1–20. https://doi.org/10.1080/17512786.2022.2098523

Hanitzsch, T., 2016. Das journalistische Feld, in: Löffelholz, M., Rothenberger, L. (Eds.), Handbuch Journalismustheorien. Springer Fachmedien Wiesbaden, Wiesbaden, pp. 281–293. https://doi.org/10.1007/978-3-531-18966-6_16

Harro-Loit, H., Josephi, B., 2020. Journalists' Perception of Time Pressure: A Global Perspective. Journalism Practice 14, 395–411. https://doi.org/10.1080/17512786.2019.1623710

Heintz, B., 2007. Zahlen, Wissen, Objektivität: Wissenschaftssoziologische Perspektiven, in: Mennicken, A., Vollmer, H. (Eds.), Zahlenwerk. VS Verlag für Sozialwissenschaften, Wiesbaden, pp. 65–85. https://doi.org/10.1007/978-3-531-90449-8_4

Heravi, B.R., 2019. 3Ws of Data Journalism Education: What, where and who? Journalism Practice 13, 349–366. https://doi.org/10.1080/17512786.2018.1463167

Heravi, B.R., Lorenz, M., 2020. Data Journalism Practices Globally: Skills, Education, Opportunities, and Values. Journalism and Media 1, 26–40. https://doi.org/10.3390/journalmedia1010003

Hermida, A., Young, M., 2019. Data journalism and the regeneration of news, Disruptions : studies in digital journalism. Routledge, London ; New York.

Houben, D., Prietl, B., 2018. Strukturdynamiken, Reproduktionsmechanismen und Subjektformen der Datengesellschaft, in: Houben, D., Prietl, B. (Eds.), Digitale Gesellschaft. transcript Verlag, Bielefeld, Germany, pp. 323–382. https://doi.org/10.14361/9783839439579-014

Knight, M., 2015. Data journalism in the UK: a preliminary analysis of form and content. Journal of Media Practice 16, 55–72. https://doi.org/10.1080/14682753.2015.1015801

Prietl, B., Houben, D., 2018. Einführung. Soziologische Perspektiven auf die Datafizierung der Gesellschaft, in: Houben, D., Prietl, B. (Eds.), Digitale Gesellschaft. transcript Verlag, Bielefeld, Germany, pp. 7–32. https://doi.org/10.14361/9783839439579-001

Schultz, I., 2007. THE JOURNALISTIC GUT FEELING: Journalistic doxa, news habitus and orthodox news values. Journalism Practice 1, 190–207. https://doi.org/10.1080/17512780701275507

Stalph, F., 2020. Datenjournalismus: Eine Dekonstruktion aus feldtheoretischer und techniksoziologischer Perspektive. Diss, Uni Passau.

Stalph, F., 2019. Hybrids, materiality, and black boxes: Concepts of actor-network theory in data journalism research. Sociology Compass 13. https://doi.org/10.1111/soc4.12738

Stalph, F., 2018. Classifying Data Journalism: A content analysis of daily data-driven stories. Journalism Practice 12, 1332–1350. https://doi.org/10.1080/17512786.2017.1386583

Tandoc, E.C., Oh, S.-K., 2017. Small Departures, Big Continuities?: Norms, values, and routines in The Guardian 's big data journalism. Journalism Studies 18, 997–1015. https://doi.org/10.1080/1461670X.2015.1104260

Tong, J., Zuo, L., 2021. The Inapplicability of Objectivity: Understanding the Work of Data Journalism. Journalism Practice 15, 153–169. https://doi.org/10.1080/17512786.2019.1698974

Tong, J., 2022. Rethinking the Expertise of Data Journalists: A Case Study. International Journal of Communication 16, 2781-2800.

Weinacht, S., Spiller, R., 2022. Datenjournalismus in Deutschland revisited: Eine vergleichende Berufsfeldstudie im Längsschnittdesign. Publizistik 67, 243–274. https://doi.org/10.1007/s11616-022-00747-7

Weinacht, S., Spiller, R., 2014. Datenjournalismus in Deutschland: Eine explorative Untersuchung zu Rollenbildern von Datenjournalisten. Publizistik 59, 411–433. https://doi.org/10.1007/s11616-014-0213-5

Metaverse. Old urban issues in new virtual cities

Luis Martin Sanchez[1][2]

[1]Research Fellow – University of Turin, Italy

[2]Adjunct Professor – Politecnico di Torino, Italy

Abstract. Recent years have seen the arise of some early attempts to build virtual cities, utopias or affective dystopias in an embodied Internet, which in some respects appear to be the ultimate expression of the neoliberal city paradigma (even if virtual). Although there is an extensive disciplinary literature on the relationship between planning and virtual or augmented reality linked mainly to the gaming industry, this often avoids design and value issues. The observation of some of these early experiences - Decentraland, Minecraft, Liberland Metaverse, to name a few - poses important questions and problems that are gradually becoming inescapable for designers and urban planners, and allows us to make some partial considerations on the risks and potentialities of these early virtual cities.

Keywords: Metaverse; Urban Design; Neoliberal City; Urban Issues; Virtual Cities

1 Metaverse: a virtual oasis in a polycrisis scenario?

On 29 October 2021, after almost two years of pandemic crisis, Facebook Inc., the famous multinational technology conglomerate, announced at the company's annual conference 'Facebook Connect', the immediate change of the corporation name to Meta Platforms Inc. The announcement marks a change of strategy of the first (and still the most important) social network in history, protagonist since 2006 of the Web 2.0 revolution, towards the construction of the 'Metaverse', beginning, de facto, what many consider a further revolution towards Web 3.0.

However, the issue of building virtual 'worlds' was certainly not new. Already by the end of 2021, there were at least 160 companies dedicated to the 'construction' of virtual worlds. However, the change of name of an important multinational as Facebook, as well as the announcements of huge investments in this new technology (software and hardware) had the effect of putting the topic of the controversial 'Metaverse' at the centre of public and academic debate, also in disciplines such as architecture and urban planning.

Although relatively recent, the term Metaverse is certainly not new either. It has been used for the first time by writer Neal Stephenson in his novel Snow Crash (1992, p. 35), published in 1992, in the following terms:

> "As Hiro approaches the Street, he sees two young couples, probably using their parents' computer for a double date in the Metaverse, climbing down out of Port Zero, which is the local port of entry and monorail stop. He is not seeing real people of course. This is all part of the moving illustration drawn by his computer according to the specification coming down the fiber-optic cable. The people are pieces of software called avatars."

Snow Crash is a post-cyberpunk science fiction novel about a dystopian late-capitalism America, where the Metaverse is an escape route from the "precariousness of being in the world" (Butler, 2013). A situation very similar to the pervasive 'polycrisis' (Zeitlin et al., 2019) that contemporary territories are experiencing today, after a pandemic lasting more than two years, the ever-increasing ecological crisis and growing socio-economic and environmental inequalities. In fact, the Metaverse is seen by many as a glossy refuge[16] for an elite class in an 'end of the world' scenario, a sort of virtual bunker where upper-class can protect itself from the many ongoing crises.

Rather than elitist virtual paradises, the hypothesis of this paper is that many of the most problematic dynamics of neoliberal cities[17] emerge in a radical and extreme way in many of the early experiments of virtual cities. And precisely because of this, they are a privileged observatory in which to investigate certain tendencies of contemporary territories. Although there is an extensive disciplinary literature on the relationship between planning and virtual or augmented reality linked mainly to the gaming industry,[18] this often avoids design and values and precisely for that reason, this paper, found on critical urbanism[19] tradition, attempts to construct a radical critique of virtual cities, with

---

[16] Perhaps the most popular recent reference point for the Metaverse is *Ready Player One*, the novel by Cline (2011), adapted, in 2018, into a film directed by Steven Spielberg. Cline's Metaverse is symbolically named the"Oasis," an utopian virtual environment the population log into in order to escape the current dystopian real environment.

[17] To further explore neoliberal city issues see: Gilles Pinson (2020), *La ville néolibérale*; Cristina Bianchetti (2016), *Spazi che contano. Il progetto urbanistico in epoca neo-liberale*; David Harvey (2011), *Le capitalisme contre le droit à la ville: néolibéralisme, urbanisation, résistances*.

[18] Cf. Drew Davidson (2007), *Space Time Play. Computer Games, Architecture and Urbanism: The Next Level* and Andrew Hudson-Smith and Moozhan Shakeri (eds.). (2022) 'Gaming, Simulations, and Planning: Physical and Digital Technologies for Public Participation in Urban Planning'.

[19] Cf. Margit Mayer, Neil Brenner, Peter Marcuse (2012), *Critical Urban Theory and the Right to the City*; Bernardo Secchi (2000), *Prima lezione di urbanistica*; Kenny Kupers *et al.* (eds.) (2022), *What Is Critical Urbanism? Urban Research as Pedagogy*.

the idea that it may be useful to improve urban policies and projects in virtual and non-virtual worlds.

This paper is organised as follows: section 2 focuses on the appearance of new urban issues during the pandemic crisis, including the affirmation of the new virtual cities in the architectural and urban academic debate. Section 3 presents a series of definitions of what is now called Metaverse and how this paper intends to deal with this issue. Section 4 presents old issues of contemporary cities that emerge in some of the new virtual cities investigated in this text. The paper concludes in section 5 with a series of suggestions towards a better design for virtual cities.

2 Crisis and new urban issues: the rise of virtual cities during pandemics

Although the first virtual worlds preceded the Covid-19 pandemic outbreak by more than twenty years (Active World[20] and Second Life,[21] for example), and without wishing to diminish the role played by technological advances, it is evident how the sudden arrival of the pandemic crisis accelerated a process that had been underway for years. The pandemic, and the various lockdowns associated therewith, by increasing social anxiety, fear of contact, and the absolute desire for immunisation (Iman, Smaraki, Rumela, 2022), created the ideal conditions for the take-off of the Metaverse, which allows forms of non-bodily socialisation in conditions of mandatory physical distance. In her poem 'The Fifth Wall', written during pandemic, the German moving image artist Hito Steyerl (2021) writes:

> "Pandemia has pushed many people into another dimension of time space – a next level of screen-based extraction. People were shocked to find the walls shutting them in had become means of communication. Their enclosures were laced with cables leading into a maze of plugs, wires and radio connections. A space of strings, proprietary infrastructure and code, separating humans and filtering communication. Fenced off by access codes, log-ins and mandatory isolation pandemia left people little choice but to perform on corporate stages, and in the process become readable and transparent to them."

---

[20] Active Worlds is an online virtual world, developed by ActiveWorlds Inc., and launched on June 28, 1995.
[21] Second Life is an online multimedia platform, developed and owned by the San Francisco–based firm Linden Lab and launched on June 23, 2003, that allows people to create an avatar for themselves and then interact with other users and user-created content within a multiplayer online virtual world.

It is no coincidence, therefore, that the topics of virtual and augmented reality, for years neglected by urban planning culture (Hudson-Smith, 2022), forcefully enter the disciplinary debate during the years of the pandemic crisis. In recent years, different positions have emerged on the effects of the pandemic crisis on urban design culture. Some accentuate its generic character, placing it within a broader framework in which various shocks make a state of crisis persistent over time (Doglio, Zardini, 2021). Others argue its exceptionality and profound repercussions on not only social but also ecosystem relations (Latour, 2020). But as Secchi (2013) suggest, crises and urban issues often coincide in history and often bring to light new themes and forms of design, new subjects and new conflicts. With the pandemic, classic issues of urbanism return to the centre of the debate and others, very deep-rooted up to that point, disappear. In this way, new issues such as virtual cities, marginalized before the crisis, are emerging and becoming relevant in the architectural and urban debate.

For sure the violent arrival of the pandemic crisis and its intertwining with the environmental crisis has forcefully brought back to the centre of our disciplines the need to rethink in all its complexity the relationship of the human with the non-human, or the more-than-human, categories that includes an infinity of subjects, from non-human animals to the new digital technologies. On the one hand, the zoonotic origin of the pandemic and, on the other, the emergence of augmented and virtual reality technologies in recent years have put the issue of *coexistence* with companion species and technologies at the centre of the academic debate, an issue that calls for a broad disciplinary reflection that addresses socio-economic, ecological, sanitary and, not least, ethical issues.

In such a perspective, 'virtuality' is not considered in a binary perspective as an 'other' to 'reality' but as an integral part of our everyday life, a very complex entanglement between humanity and technology, a condition that Jessica McLean (2020) calls "more-than-real". The interrelationships between bodies, software and machines, the symbiosis between users and devices, the algorithmic autonomies cancel out the perception of differences between human and non-human (or more-than-human) actions. Data capture and sensory recognition continue to contribute to the construction of a post-human image of bodies, connecting software, hardware, gestures, sounds, natural and artificial dimensions (Patti, 2023). From this point of view, the Metaverse virtual cities are not 'other' but already an integral part of our interconnected cities and territories.

3 What are we talking about when we talk about Metaverse?

This paper looks at the early urban experiments in the Metaverse through the perspective of urbanism without intending to be exhaustive. And although to date there is no single precise definition of what the Metaverse is, it takes this great technological, social, economic and cultural experiment very seriously in order to make a series of considerations on some of the issues facing contemporary cities. In the following paragraphs are quoted a variety of definitions of 'Metaverse' given by several scholars that will guide the choice of case studies which will be critically addressed later in this text.

The Metaverse can perhaps be defined as a digital space with an economic structure, occupied by avatars, sometimes mirroring the real world, but with multiple representations of the physical world and the ability to change time, physics and space (Hudson-Smith, 2022). Radoff (2021) suggests that the Metaverse is based on seven distinct layers: infrastructure (connectivity technologies such as 5G, Wi-Fi, cloud and hi-tech materials such as GPUs); human interface (virtual reality headsets, augmented reality goggles, haptics and other technologies that users will exploit to enter the Metaverse); decentralisation (blockchain, artificial intelligence, edge computing and other democratisation tools); spatial informatics (3D visualisation and modelling frameworks; creator economy (an assortment of design tools, digital assets and e-commerce establishments); discovery (the content engine driving engagement including ads, social media, ratings, reviews, etc.); virtual reality equivalents of digital applications (digital applications for gaming, events, work, shopping, etc.). According to Radoff (2021), the Metaverse is "the collective set of online and connected experiences one can have. The common theme is that the 'player' is connected to an online structure that allows them to change content live, connect to social live, or monetise live. The key word is 'live'. The Metaverse is a living multiverse of worlds."

Ball (2021) for his part defines the Metaverse as an extended network of persistent, real-time rendered 3D worlds, simulations that support the continuity of identity, objects, history, payments and rights and that can be experienced synchronously by an effectively unlimited number of users, each with a sense of individual presence. Robertson and Peters (2021) note that the Metaverse is an aspirational term for a future digital world more tangibly connected to our real lives and bodies.

From these definitions, it is clear that the concept of the Metaverse itself is still under development and there is not yet a complete and definitive implementation. Despite this, the economic pressures from big tech and other large technology companies as well as large investment funds to adopt virtual reality and enter Web3.0 are enormous, and are already colonising the dynamics, imagery and very essence of digital virtuality (Patti,

2023). The advent of the Metaverse represents a fundamental shift in today's notion of digital presence, towards massive interconnectedness, universal interoperability and persistent synchronicity with the creation and populating of virtual environments, a shift that cannot be ignored for long by the disciplines that deal with the design of space.

4 Old urban issues in new virtual cities

In this text, an attempt will be made to examine, without the ambition of being exhaustive, some urban issues that have emerged from the observation of the first experiments dealing with virtual cities and territories, and that approach, in different ways, the concept of the Metaverse, including softwares such as Decentraland, Horizon Worlds, Minecraft, Seoul Metaverse, Liberland Metaverse and Qtopia.

The first consideration concerns the private character of these virtual cities, ultimate expression of the neo-liberal city project. In fact, in these first experiments of virtual cities consolidated urban problems of the contemporary neoliberal city seem to reappear: from the privatisation of public space, to spatial and socio-economic inequalities, redlining, touristification and financialisation processes.

The second issue has to do with the design and its imaginaries, which often re-proposes rooted and hyper-traditional images - despite the potentially high degree of creative freedom of the digital medium - without producing particularly innovative experiments as, for example, the intertwining of architecture, urbanism and cybernetics had generated in the 1960s and 1970s.

A third issue has to do with virtual cities regulatory apparatus, which struggle between the desire for freedom and the need of regulation - that many define as unworkable - potentially undermining norms, rights and values of democracies.

The fourth and final issue has to do with the Metaverse potential to build an infinity of 'multiverses' that could lead to an infinite fragmentation of socio-spatial organisations built around different types of identities in a kind of digital panarchy[22]: an exasperation of certain dynamics of socio-spatial fragmentation already present and constantly increasing in the contemporary city (Secchi, 2000).

---

[22] See Gian Piero de Bellis (2017), *Panarchia. Un paradigma per la società multiculturale*.

4.1 Metaverses as private cities: the neoliberal dream

Unlike the World Wide Web or the Internet itself, which were financed by major public institutions, the funding for the development of Web3.0 comes from large private multinationals. The major player in the Metaverse race is clearly Meta, formerly Facebook Inc., which from 2021 will call itself 'a Metaverse company'. But it is not alone. Other big technology companies such as Microsoft (with the VR social network AltspaceVR), Roblox, Decentraland, and Epic Games (the company behind the famous game Fortnite, considered by many to be a potential Metaverse) are also major players in the Web3.0 big race.

The private character of these cities - owned by large multinational technology corporations - seems to be the utmost expression of the neo-liberal project that has been affecting the contemporary city for more than forty years, and enables many problems linked to this paradigm to emerge, sometimes in a radical and extreme way, in these first virtual experiments.

A first issue is related to the strong processes of financialisation that can already be seen in platforms such as Decentraland, where in recent years there has been an incredible increase in the prices of plots sold in the form of NFT.[23] Decentraland is a virtual reality platform powered by Ethereum's blockchain where users can create, experience and monetise content and applications. The grounds of Decentraland are permanently owned by the community, which thus has full control over its creations. Here, users claim ownership of a virtual land on a blockchain-based ledger and land owners control what content is published on their portion of land, identified by a set of Cartesian coordinates (x,y). Land is a non-fungible, transferable and scarce (90,000 plots circa) digital asset stored in an Ethereum smart contract and can be purchased by spending an ERC20 token called MANA (Ordano et al., 2017).

The large increase in the cost of 'land' in Decentraland has recently been the subject of much attention in public and academic debate. While in the early years of the platform (2017) the price per plot was around $20, today (2023) the cheapest ones are sold for around $12,000 each, a price increase of about 60 000 per cent in just six years[24]. In the virtual city of Decentraland, as in contemporary metropolises, centrally located plots have higher prices than peripheral ones. As Goldberg, Kugler, and Schär argue in their paper 'Land Valuation in the Metaverse: Location Matters' (2022) location matters even in a virtual world with negligible mobility costs like Decentraland. For the authors, investors'

---

[23] NFT stands for 'non-fungible token'. A non-fungible token is a unique digital identifier that is recorded on a blockchain, and is used to certify ownership and authenticity.

[24] For example, a company recently made headlines by paying almost one million euro for 259 plots of land for a virtual shopping centre on Decentraland (Howcroft, 2021).

location preferences are associated with plots close to popular landmarks, usually those more centrally located and for plots with more memorable addresses. It emerges how new virtual cities incorporate traditional real estate market dynamics and thus it is no coincidence that virtual real estate agencies have arisen in recent years, such as the very popular Metaverse Properties. This strong ongoing process of financialisation can generate, as in physical cities, increasing spatial inequality, processes of redlining and exclusion of minorities and vulnerable groups, also in the Metaverse.

Other urban issues have to do with virtual cities touristification processes, as in the case, for example, of Seoul Metaverse, the virtual version of Seoul, South Korean capital, launched during the Covid-19 pandemic. One of the main aims of the platform was, in fact, to allow people to 'visit' the city's main tourist attractions in a situation of physical isolation such as that caused by the pandemic, in a kind of virtual touristic experience. A highly extractive vision of cities that recurs in many experiences of the Metaverse.

Finally, issues related to the digital divide posed by the Metaverse diffusion cannot be left aside. Despite the fact that many of these experiences emphasise the potential of accessibility to services even in isolated situations - e.g. the Seoul Metaverse, which provides access to many public services - it is clear that it poses accessibility problems for people without the possibility of acquiring or using hardware and software that allow them to take advantage of the Metaverse experience. Again, this potentially generates dynamics of economic, ableist and/or generational inequality.

4.2 Design imaginaries in virtual cities: the dictatorship of neoliberal realism

The second part of my argument has to do with the design imaginaries of many of the new mainstream virtual cities. From my point of view, there are two trends, which are not mutually exclusive, that highlight the strength of the 'dictatorship of realism' in design practices and imaginaries, even in a situation of potential total creative freedom as in the virtual field. On the one hand, we find imaginaries related to the gaming industry, and we see this in almost all the case studies investigated, from Second Life to Roblox, Decentraland, Horizon Worlds and Minecraft. On the other hand, there are imaginaries drawn from the neo-liberal city, and among the cases investigated the best example is the Liberland Metaverse designed by the Zaha Hadid studio.

Minecraft, described by many as a kind of digital Lego (Olmedo, 2013), is an excellent example of a widespread type of aesthetic in early virtual cities experiments. Minecraft is an open-ended 'sandbox' game designed by Markus Persson and published by Mojang, in which players build textured cube constructions, block by block, in a world with its own physical laws (Overby & Jones, 2015). It is perhaps the best example of player-created urban space in a game environment. Currently owned by Microsoft and available on

multiple gaming platforms, as of April 2021 there were 139 million monthly active players, with 238 copies of the game sold worldwide (Microsoft, 2021).

Liberland Metaverse is exemplary of another type of aesthetic emerging from early examples of digital cities. Designed by the famous Zaha Hadid studio, the forms and spaces of this digital city are not particularly different from the studio's designs in the Far East or the Gulf countries. The forms and spaces are more or less the same (i.e. emphasis on fluidity and continuity of forms), issues and obsessions of contemporary design are repeated (i.e. very traditional techno-ecological scenarios).

Liberland Metaverse is a virtual city created as an extension of the Free Republic of Liberland, a libertarian micro-state founded by right-wing Czech activist Vít Jedlička in 2015 on a swampy plot of land only three square miles in the border between Croatia and Serbia. Not being officially recognised by any nation, the libertarian experiment decided to move to the virtual domain. To date it counts, according to its promoters, more than 700,000 applications for citizenship.

With the grand narratives of the 20th century gone, it would seem that the imaginaries of urban and architectural design are abandoning their utopian instances, "that insolent claim to change the world" of which Hirschmann (1982) speaks, and surrendering to the dictatorship of neo-liberal realism, to the Thatcherian "there is no alternative". The Metaverse virtual cities are very distant from the ideological, formal and spatial tensions of the two great urban models of the Modern Movement, F. L. Wright's 'Boadacre City' and Le Corbusier's 'Ville Radieuse' but also from the radical high-tech architecture experimentations linked to the emergence of cybernetic systems[25] in the late 1960s and the beginning of the 1970s.

4.3 Virtual cities regulatory apparatus: between surveillance and anarchy

A third issue concerns the virtual cities regulatory apparatus. The private, undefined and unexplored nature of these virtual worlds challenges established norms, rights and values of physical cities. In the following paragraphs, we will critically describe some current trends based on some recently much-discussed examples.

It is well known that sensitive data management in big tech in recent years has not been particularly transparent (Urman, Makhortykh, 2023). In the case of Web 3.0, commercial targeting could be taken to the extreme, as important biometric data, from retinal dilation to heart rate or gestures, etc., could be collected. In short, surveillance capitalism (Zuboff, 2019) taken to the extreme. The problems of content regulation in social networks - one need only mention the recent events of X, formerly Twitter - are also well known and

---

[25] See: Nicolas Schöffer (1969), *La Ville Cybernétique.*

undermine fundamental issues of liberal societies. These factors are taken to their limits in Web 3.0 where the experience of *immersion* and *presence*, the main neurological parameters that virtual reality brings into play (La Trofa, 2022), are taken to extremes. Regulation here has to deal not only with fake news or hate speech, but with acts, movements, gestures, speech. All in real time.

In this regard, the first cases of sexual harassment on some virtual platforms including Horizon Worlds, one of META's virtual reality applications, caused a major scandal (Diaz, 2022). Due to such scandals, the discourse of regulation in the Metaverse has become central to the public debate, raising numerous questions about the interrelationship between the real and the virtual field. The debate was polarised between those who downplayed the issue - mainly citing gaming experiences where situations of violence are normalized - and those who, from a post-human perspective, where bodies, machines and software become one, have defined it as *real* harassment.

Meta's response to these cases was the creation of the 'safe space', conceived 'as a personal security bubble', which recalls Peter Sloterdijk's anti-modernist metaphors in the Spheres trilogy (1998, 1999, 2004). Andrew Bosworth, Meta's Chief Tech Officer, admitted in an internal memo quoted by the Financial Times (Murphy, 2021) that moderation in the Metaverse "on any meaningful scale is virtually impossible". The report 'Metaverse: another cesspool of toxic content' (2022) developed by the non-profit advocacy organisation SumOfUs shows, among many other alarming data, how regulated spaces on Horizon Worlds are actually very limited.

The idea of building spaces of freedom in utopian worlds - even in the anarchist and libertarian matrix - have always been part of the architectural and urban design culture, becoming spatial manifestos of ambitious ideological instances of change.[26] The Metaverse has the potential to become a space of freedom for creative thought and action, but it would seem that in the current mainstream dynamics there is a risk that it will become a place of exclusion and violence for minorities and marginalised groups. News about first Interpol office opening[27] in the Metaverse that aims to 'combat online crime of any nature' (2022) would seem to propose a scenario where traditional regulatory apparatus, control and surveillance tools will try to reproduce themselves in the near future, to a greater or lesser extent, also in virtual cities.

---

[26] In this respect as well, the radical architecture of the 1960s and 1970s was emblematic. In France, the G.I.A.P. (Group International d'Architecture Prospective): Paul Maymont, Yona Friedman, Walter Jonas, and Nicolas Schòffer. In Italy, Superstudio and Archizoom Associati. In the United Kingdom, Archigram. In Japan, the metabolism movement including Kenzo Tange and Arata Isozaki.

[27] See: Interpol Technology Assessment Report on Metaverse, October 2022.

4.4 On the necessity of a new project for a 'bubble city' scenario

Another scenario, again in response to regulatory concerns, could be the multiplication of meta-worlds created for specific communities as a protective response in an unsafe arena. Is that already the case of Qtopia[28] which presents itself as the first Metaverse for the LGBTQ+ community. As stated on their website "Qtopia is the first Metaverse by and for the LGBTQ community (…) the Qtopia Metaverse aims to provide an inclusive virtual space for the LGBTQ+ community, friends and allies to connect, while giving back to LGBTQ+ causes. Qtopia is being created with an emphasis on equality, diversity and sustainability." The Metaverse's potential to create an infinite multiverse could lead to an infinite and fragmented socio-spatialscenario, built over different identities in a sort of a digital identitarian panarchy.

The fragmentation tendency of the contemporary city (and society) is certainly not a new issue for designers and urban planners to deal with. European cities since the last years of the 20th century, when the egalitarian instances of the Welfare State ended, but especially in the last two decades in a situation of continuous crises (economic, financial, demographic, migratory, pandemic, ecological) have experienced a constant and unstoppable process of spatial "fragmentation" also linked to an increase in socioeconomic inequalities, which designers and urban planners have addressed in different ways, from condemnation to acquiescence (Secchi, 2005; Donzelot, 2009). Spatial expressions of this phenomenon are, for example, the gated communities, the new exclusive eco-neighborhoods, the gentrified and patrimonialized city centers, and at the other extreme, the places of exclusion such as the most difficult city suburbs and the informal settlements linked to immigrants, *sans-papiers*, homeless and new nomadic populations.

This bubble-city scenario, taking up again Sloterdijk's metaphor,[29] poses yet significant questions to contemporary urbanism, which draws its inheritance from the modern idea of society (and not groups or communities), and democratic and secularly spaces. The question is how such an anti-enlightenment and anti-modernist scenario like this, that virtual cities may exacerbate, could be governed and designed.

---

[28] See: https://alphaverse.com/qtopia/#.

[29] Sloterdijk (2015), quoting Jakob von Uexküll's reflections on the foundations of theoretical biology, states: "it was a mistake to believe that the human world constituted a space shared by all living beings. Every living creature has its own particular space that is as real as the space proper to human beings. This perspective offers us a completely new view of the universe as something that does not simply consist of a soap bubble that we have inflated to such a size that it goes beyond our horizons, assuming infinite proportions, but rather is made up of millions of distinctly distinct bubbles that overlap and intersect everywhere."

5 Towards a radical project for virtual cities

Contemporary dystopia or utopia, what are these new virtual cities? The construction of better cities and better 'worlds' has always obsessed designers and urban planners. The digital field gives us this possibility but it would seem to re-propose well-rooted imaginaries and problematic issues of contemporary cities.

As Federica Patti (2023) points out, on the one hand, early experiences in the Metaverse highlight the "extrusion and surveillance dynamics at work as well as the intrusive reach of marketing using adaptive algorithms to personalise artificial intimacy, the perpetuation of imaginaries of domination, the emergence of new digital crimes, and the management of privacy, transparency and fakes." On the other, it seems that the "world of finance and big brands is already colonising dynamics, imaginaries and the very essence of digital virtuality." The virtual spaces of the Metaverse pose ethical questions of inclusion and decentralisation, of norms, rights and values, of economic, social, and not least ecological sustainability and equity that need to be addressed immediately. In fact, another inescapable issue is related to the unsustainability - understood in socio-ecological terms - of these virtual cities, which re-propose an advanced extractivist and unequal techno-capitalist vision, without posing the main question that the current state of polycrisis poses - a project for the care of the world.

Such a scenario bring into play academics, practitioners and policy makers dealing with architectural and urban design. At least three issues emerge from this paper that could be useful for the construction of better design strategies for virtual cities. The first recommendation is to strengthen the practices of commoning within the projects of virtual cities, as some experiments on contemporary digital art suggest.[30] The goal is to challenge the big digital platforms monopoly on virtual practices and imaginaries through open source infrastructures imagined as common goods accessible to all and not just an upper class elite. The second recommendation advocates a greater focus on digital spatialities within academic research and educational practices in the field of architecture and urbanism. The close intertwining of the digital and non-digital worlds urgently demands that our disciplines pay more attention to the design of an original virtuality as just, radical and experimental spaces. The last suggestion addresses the regulatory apparatus of virtual cities, which needs to find a middle ground between a situation of total anarchy and an absolute surveillance delegation to large multinational technology corporations. It is suggested to empower intermediate regulatory entities - digital citizens, groups and associations - which through agency strategies strengthen our democracies also in the virtual arena.

---

[30] See Federica Patti (2023) 'Performatività posthuman e dinamiche del Metaverso:
A Matter of eXperience'.

The advent of the Metaverse, a fundamental shift in today's notion of digital presence, towards massive interconnectedness, universal interoperability and persistent synchronicity, with the creation and populating of virtual environments, calls for serious reflection on the need for new imaginaries on the digital field, a radical 'politics of the imagination' (Didi-Hubermann, 2010). Also in the architectural and planning disciplines.

6 Acknowledgments

References

Ball, M. (2021) 'Framework for the metaverse', MatthewBall.co, 29 June [online]. Available at: https://www.matthewball.vc/all/forwardtothemetaverseprimer

Bianchetti, C. (2016) Spazi che contano. Il progetto urbanistico in epoca neo-liberale. Roma: Donzelli Editore.

Cline, E. (2011) Ready player one. New York City: Crown Publishing Group.

Davidson, D. (2007) Space Time Play. Computer Games, Architecture and Urbanism: The Next Level. Berlin: Walter de Gruyter GmbH.

de Bellis G. P. (2017) Panarchia. Un paradigma per la società multiculturale. Roma: D Editore.

Didi-Huberman, G. (2010) Come le lucciole. Una politica delle sopravvivenze. Torino: Bollati Boringhieri.

Doglio, F. and Zardini, M. (2021) Dopo le crisi. 1973, 2001, 2008, 2020, Siracusa: LetteraVentidue.

Donzelot, J. (2009) La ville a trois vitesses, Paris: Les Éditions de la Villette.

Goldberg, M., Kugler, P. and Schär, F. (2021) 'Land Valuation in the Metaverse: Location Matters', 29 September [online]. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3932189#paper-citations-widget

Harvey, D. (2011) Le capitalisme contre le droit à la ville: néolibéralisme, urbanisation, résistances. Paris: Éditions Amsterdam.

Hirschman, A. O. (1982) Shifting Involvements. Private Interest and Public Action. Princeton: Princeton University Press.

Howcroft, E. (2021) 'Virtual real estate plot sells for record $2.4 million', Reuters, 24 November [online]. Available at: https://www.reuters.com/markets/currencies/virtual-real-estate-plot-sells-record-24-million-2021-11-23/

Hudson-Smith, A. and Shakeri M. (eds.). (2022) 'Gaming, Simulations, and Planning: Physical and Digital Technologies for Public Participation in Urban Planning', Urban Planning, Volume 7, Issue 2.

Hudson-Smith, A. (2022) 'Incoming Metaverses: Digital Mirrors for Urban Planning', Urban Planning, Volume 7, Issue 2, pp. 343–354.

Iman P., Smaraki M. and Rumela S. (2022) 'The role of social virtual world in increasing psychological resilience during the on-going COVID-19 pandemic', Computers in Human Behavior, Volume 127.

Interpol (2022) 'Interpol Technology Assessment Report on Metaverse' [online]. Available at: https://www.interpol.int/News-and-Events/News/2022/INTERPOL-launches-first-global-police-Metaverse

Kupers K. et al. (eds.). (2022), What Is Critical Urbanism?Urban Research as Pedagogy. Zurich: Park Books.

Latour, B. (2020) 'Immaginare gesti-barriera contro il ritorno alla produzione pre-crisi', Antinomie, 9 April [online]. Available at: https://antinomie.it/index.php/2020/04/09/immaginare-gesti-barriera-contro-il-ritorno-alla-produzione-pre-crisi/?fbclid=IwAR31ofpr1k9iWy4-ihs_TBzGTHgP_KfDwucBWXJZVddedwb3xqlMXGzCKhQ

La Trofa, F. (2022) Realtà virtuale e metaverso, tra immersione e presenza, Tech4Fturure, 20 May [online]. Available at: https://tech4future.info/realta-virtuale-metaverso-immersione-presenza/

Mayer, M., Brenner N. And Marcuse P. (2012) Critical Urban Theory and the Right to the City. Milton Park: Taylor and Francis.

McLean, J. (2020) Changing Digital Geographies. Technologies, Environments and People, London: Palgrave Macmillan.

Microsoft, (2021) 'Earnings release FY21 Q3', 27 April [online]. Available at: https://www.microsoft.com/en-us/Investor/earnings/FY-21-Q3/press-release-webcast

Murphy, H. (2021) 'How will Facebook keep its metaverse safe for users?', Financial Times, 12 November [online]. Available at: https://www.ft.com/content/d72145b7-5e44-446a-819c-51d67c5471cf

Olmedo, H. (2013) 'Virtuality continuum's state of the art', Procedia Computer Science, 25, pp. 261–270.

Overby, A. and Jones, B. L. (2015) 'Virtual LEGOs: Incorporating Minecraft into the art education curriculum', Art Education, 68(1), pp. 21–27.

Patti, F. (2023) 'Performatività posthuman e dinamiche del Metaverso: A Matter of eXperience', Kabul Magazine, Issue 23 [online]. Available at: https://www.kabulmagazine.com/performativita-posthuman-e-dinamiche-del-metaverso-a-matter-of-experience/

Pinson, G. (2020) La ville néolibérale. Paris: Presses Universitaires de France.

Radoff, J. (2021) 'What We Talk About When We Talk About the Metaverse', Medium, 26 February [online]. Available at: https://medium.com/building-the-metaverse/what-we-talk-about-when-we-talk-about-the-metaverse-c9ef03c1a5dd

Robertson, A. and Peters, J. (2021) 'What is the metaverse, and do I have to care? One part definition, one part aspiration, one part hype', The Verge, 4 October [online]. Available at: https://www.theverge.com/22701104/metaverse-explained-fortnite-roblox-facebook-horizon

Secchi, B. (2000) Prima lezione di urbanistica. Roma: Laterza.

Secchi, B. (2005) La città del ventesimo secolo. Roma: Laterza.

Secchi, B. (2013) La città dei ricchi e la città dei poveri. Roma: Laterza.

Sloterdijk, P. (2015) 'Monologo sulle poetiche dello spazio', Philosophy Kitchen — Rivista di filosofia contemporanea, Anno 2, N. 2 – 2015, pp. 139–157.

Stephenson, N. (1992) Snow Crash. 1st ed. New York: Bantam Books.

Steyerl, H. (2021) 'The Fifth Wall', [online]. Available at: https://www.hebbel-am-ufer.de/en/hau3000/hito-steyerl-the-fifth-wall/

SumOfUs (2022) 'Metaverse: another cesspool of toxic content' [online]. Available at: https://www.eko.org/images/Metaverse_report_May_2022.pdf

Urman, A. and Makhortykh, M. (2023) 'How transparent are transparency reports? Comparative analysis of transparency reporting across online platforms', Telecommunications Policy, Volume 47, Issue 3, [online]. Available at: https://www.sciencedirect.com/science/article/pii/S0308596122001793

Zeitlin J., Nicoli F. And Laffan, B. (2019) 'Introduction: the European Union beyond the polycrisis? Integration and politicization in an age of shifting cleavages', Journal of European Public Policy, 26, pp. 963-976.

Ethics Assessment of R&D Supported by Standardisation

I. Mijatović [1], A. Kićanović [1] and B. Tošić [1]

[1] University of Belgrade – Faculty of Organizational Sciences, Serbia

Abstract. Standardisation and standards can be valuable tools for valorisation, commercialisation, and subsequent use of research and development (R&D) results. Furthermore, standards can help researchers in their research in multiple ways, e.g., by preventing them from reinventing the wheel. Most researchers are not familiar with standardisation and rarely use standards in their research projects. How do researchers perceive standards and standardisation? The study aims to analyse researchers' experience with defining the ethical aspects of their research projects (as well as their project proposals) and the perceived usefulness of the framework provided in CWA 17145-1 and CWA 17145-2. Study participants are experienced researchers in writing project proposals and have no experience with standards and related documents. The data collection is based on two-step semi-structured interviews. First, the study explores the researchers' experiences and attitudes on common basic ethical principles, approaches, and practices used by EU-funded R&D projects. In the next step, we inform the study participants about the framework for the ethics assessment of R&D and provide them with documents: CEN/CENELEC Workshop Agreements (CWAs) – CWA 17145-1 and CWA 17145-2. Using a second semi-structured interview, we collect data on researchers' perceptions. The study results provide insight into researchers' perceptions of the usefulness of the CWAs and the framework and their attitudes toward standards (and related documents) and standardisation.

1 Introduction

The European Union (EU) Strategy on Standardisation underlines the importance of standardisation for "Europe's competitiveness, technological sovereignty, ability to reduce dependencies and protection of EU values, including social and environmental ambitions". Furthermore, the success of the Strategy on standardisation will depend on how successful European actors will be in standardisation at the international level (EC, 2022, p. 1). Standardisation can help researchers valorise, commercialise, and use their research results. However, most researchers are unfamiliar with standardisation and rarely use standards in their research. One of the aims of the EU Strategy is to support

researchers from EU-funded research projects to valorise project results through standardisation activities and anticipate early standardisation needs (EC, 2022, p. 1).

The European Commission (EC) published the Code of Practice on Standardisation in the European Research Area with recommendations for research organisations to include standardisation as an important tool for valorising and commercialising research results (EC, 2023, p. 1). According to the Code of Practice on Standardisation in the European Research Area: "Standards help researchers and innovators bring their innovation closer to the market and spread technological advances by establishing uniform criteria and by developing methods, practices, and procedures publicly available in a formal document. European and international standards provide access to large global and regional markets for innovative new products and services" (EC, 2023, p. 1).

Several initiatives are active to support the research projects funded by the European Commission. HSbooster.eu is a 24-month European Commission initiative that will provide the European Standardisation Booster. The booster offers expert services for European projects to help them increase and valorise project results by contributing to the creation or revision of standards. HSbooster.eu facilitates and streamlines the dialogue between Horizon 2020 (H2020) and Horizon Europe (HE) research and innovation projects with the standardisation landscape and its main actors, namely corresponding Standards Developing Organisations (SDOs) to increase the European impact on international standardisation and strengthen the European competitiveness.

Standards can be defined as "a widely agreed way of doing something" (Abdelkafi *et al.*, 2021, p. 5). A standard is "a construct created by a meaningful, reasonable, and collective choice that enables agreement regarding the solution of existing problems" (Cargill, 2011). However, not all research results are solutions suitable for standards. In most cases, for researchers engaged in R&D projects that have developed innovative solutions in some fields, standards are not an appropriate way to disseminate project results because these solutions need time to reach a satisfactory level of technology stability (CEN/CENELEC, 2020, p. 7). Within standardisation – no matter its type (e.g., is it formal or informal standardisation, is it recognised by law or states, or is it consortia-based standardisation), one cannot do very much alone. A new solution must be of certain market readiness to reach targeted and interested stakeholders who could support the common agreement on specific solutions at standardisation comities.

To answer researchers' needs regarding standardisation, European organisations for standardisation CEN/CENELEC have developed "standards-light-like instruments" which do not require complete stakeholder consensus regarding the solution given in it. These instruments are called CEN/CENELEC Workshop Agreements (CWAs). CWA is a "CEN and/or CENELEC deliverable developed by a Workshop, which reflects an agreement between identified individuals and organisations responsible for its contents"

(CEN/CENELEC, 2022, p. 9). A CWA can take a different form, such as a text file or code, and it is developed to meet an urgent need of the stakeholders interested in the issue (CEN/CENELEC, 2020, p. 5). Therefore, the time for the drafting document is short; it usually takes 6 to 12 months to have a published CWA by CEN/CENELEC Members. CWAs are established to deal with tasks specified in their project plan and separated from Technical Committees (CEN/CENELEC, 2020, p. 7). A developed CWA can be proposed for conversion into a European standard to a Technical Committee. If they approve the proposal, the CWA must go through the standard development process by the rules of CEN/CENELEC (CEN/CENELEC, 2020, p. 7).

Each R&D EU-funded project must define the ethical aspects of its research projects (as well as its project proposals) in its project documentation and research activities during the project's lifetime. But the question is, which project participant or participants will do an ethics assessment of a project proposal, or will all do it? Or would they engage consultants with expertise in ethics to deal with these issues on their project? Another side of the medal is whether there is support such as good practices, e.g., some already developed (and endorsed) frameworks which could help them address ethical issues. Finally, the critical question is whether standardisation could support the ethics assessment of R&D, e.g., with a common ethics assessment framework given in CWA.

2 Literature Review

Compared to traditional research ethics which gained momentum after the Second World War (and the Nuremberg Code), both theoretical and empirical discussions on the ethics assessment of research and innovation (R&I) commenced during the 1990s (Reijers *et al.*, 2018). Various studies on the ethics assessment of R&I have emerged ranging from engineering sciences (Riley, 2013) and business studies (Bose, 2012), emerging technologies (Brey, 2012b) and ICTs studies (Brey, 2012a) to biomedical sciences (Winkler, Hiddemann and Marckmann, 2011) and nanotechnology studies (Viseu and Maguire, 2012). Zwart et al. (2014) have studied legal and social aspects of the ethics assessment of R&I. Reijers et al. (2018) analysed 35 different methods for ethics assessment based on the various stages of the R&I process. Additionally, the ethics assessment of R&I may "manifest itself in formulations of R&I project-specific codes of conduct or checklists of ethical issues and principles; also, it can take the shape of ethicists joining in the design process of new technologies and innovations, and of researchers and stakeholders engaging in a collaborative setting" (Reijers *et al.*, 2018, pp. 1438).

At the European level, ELSA studies covered ethical, legal, and social aspects of emerging sciences and technologies (Zwart, Landeweerd and van Rooij, 2014). ELSA concept which dates back to the Fourth EU Framework Programme (1994-1998) must be distinguished from ELSI which refers to ethical, legal and social implications of emerging life sciences, notably human genomics, a program funded by NIH/NHGRI (Zwart, Landeweerd and van Rooij, 2014). Also, Responsible Research and Innovation (RRI) studies emerged, being part of the projects funded by the European Commission (Burget, Bardone and Pedaste, 2017). Drawing upon the Sixth Framework Programme (2002-2006) – "responsible research" emerged aiming to address "ethics: networking between existing bodies and activities, promotion of dialogue in a global context, awareness raising, training, research on ethics in relation to science and technology; and uncertainty: risk and the precautionary principle: analysis and best practice" (European Commission, 2002, pp. 10). Based on the Seventh Framework Programme (2007-2013) – "responsible research and innovation" emerged and evolved as a part of the Regulation EU No (1291/2013) establishing Horizon 2020 – the Framework Programme for Research and Innovation (2014-2020) (European Commission, 2021).

Over the years, both ELSA studies and the RRI literature much as its antecedents (such as bioethics) "have triggered scepticism and criticism from various corners" (Zwart, Landeweerd and van Rooij, 2014, p. 8). Comparing ELSA studies and RRI – both streams argue that "scientific expertise cannot be deemed as the sole basis for the development of new technologies; conversely, society should be involved early on" (Burget, Bardone and Pedaste, 2017, p. 3). Additionally, both streams have been enforced by policy-makers and not the research communities which may be one of the reasons why the EC publications have been cited vigorously, especially within the RRI literature (Gwizdała and Śledzik, 2017). Although "ELSA bears a striking resemblance to RRI" (Burget, Bardone and Pedaste, 2017, p. 2) – Von Schomberg (2012, pp. 16) argues that "RRI sees ethics as a stimulus, not an obstacle", suggesting that "what's new about RRI is that we no longer see the ethical aspects of new technologies as constraints, as restrictions. Instead, we look at the aims of technology development. Which positive contributions do you wish to obtain from research and innovation? This positive basic attitude is an important difference in comparison with the ELSA approach" (Von Schomberg, 2012, quoted in Zwart, Landeweerd and van Rooij, 2014, pp. 13). Additionally, the same author (pp. 16) suggests that "RRI rebels against the more traditional approach (which was focussing on the question whether a development has undesired effects), but rather uses the possible positive contributions of [...] a technology as an assessment criterion [...] unlike ELSA, RRI considers the entire innovation process, from research and development to production or distribution" (Von Schomberg, 2012, quoted in Zwart, Landeweerd and van Rooij, 2014, pp. 13).

Although a lot has been done to address the ethics assessment of the R&I projects funded by the European Commission, the European Commission is currently working on addressing several questions concerning the ethics assessment of the R&I projects. To date, several EU-funded R&D projects had developed CWAs, such as – MODENA, SATORI, SMR, DRIVER+, EPOS, SMARTER TOGETHER, COROMA, BRESAER, BIONIC AIRCRAFT, VOLATILE, MONSOON, UNICORN, REACH2020, WISEGRID, ETIP OCEAN 2, SEA-TITAN, etc. One of the projects on ethics assessment of R&I titled "Stakeholders Acting Together on the ethical impact assessment of Research and Innovation – SATORI" (www.satoriproject.eu) which was funded by the EU aimed at summarising the descriptions of the ways in which ethics assessment of R&I are currently practised in different scientific fields, in different European countries, but also China, and the US, and also within different types of organisations (Brey *et al.*, 2017). Additionally, the project offered a common framework for the ethics assessment of R&I consisting of common basic ethical principles and joint approaches and practices that are supported and shared by all the main stakeholders involved in the design and application of research ethics, ethics of technology and innovation standards and principles (Brey *et al.*, 2017). As a result of the project, two CWA (i.e. pre-standard) documents have also been drafted and approved by a Workshop and endorsed by CEN members:

1. CWA 17145-1:2017, Ethics Assessment for Research and Innovation
   – Part 1: Ethics Committee and
2. CWA 17145-2:2017 Ethics Assessment for Research and Innovation
   – Part 2: Ethical impact assessment framework.

Both parts of CWA should be used to enhance the ethics assessment of R&I and are "of interest to organisations or agents who are involved in performing, commissioning or funding research and innovation, and therefore have a responsibility to address ethical issues" (SATORI, 2017). Both parts of CWA are a result of a consensus-based multistakeholder process ("but quicker and less rigorous than with a full standard") and are developed when existing procedures and best practices in ethics assessment were translated into a practical tool for anyone who would like to enhance ethics assessment (SATORI, 2017).

While Part 1: CWA 17145-1 gives recommendations on the ethics committee members (their roles and responsibilities, competencies, appointments, composition, etc.), ethical issues and principles, procedures, and quality assurance in ethics assessment (CEN, 2017a), Part 2: CWA 17145-2 describes the ethical impact assessment framework, alongside guidance on conducting the ethical impact assessment threshold analysis, ethical impact assessment plan, ethical impact identification, ethical impact evaluation, remedial actions, and review and audit of the ethical impact assessment (CEN, 2017b). While Part 1: CWA 17145-1 applies to "ethics committees, institutional review boards,

ethical review committees, ethics boards, and units consisting of one or more ethics officers, regardless of size, scope, and research and innovation area" (CEN, 2017a, p. 5), Part 2: CWA 17145-2 applies to "all researchers and innovators, regardless of the context they are working in or their research and innovation area" (CEN, 2017b, p. 6).

Given that "all organisations or agents who are involved in performing, commissioning or funding research and innovation, … have a responsibility to address ethical issues" (CEN, 2017a, p. 6) – the key Research Questions (RQ) that our study seeks to answer are –

RQ1: How do researchers perceive the main obstacles during the ethics assessment of R&D projects?

RQ2: What are researchers' attitudes towards using standards-like documents – based on their perception of the CWAs for the ethics assessment of the R&D projects?

3 Methodology

3.1 Sample

Our sample included researchers with experience in writing research proposals and participating in EU-funded R&D projects. We interviewed a total of 15 researchers from the University of Belgrade with experience in R&D projects (usually from 1 to 10 years). Most interviewed researchers are males (73%), and the rest (27%) are females. Also, the research areas covered with the projects are Business, Economics, and Finance; Political Sciences, Information Technologies (IT), Artificial Intelligence (AI), Machine Learning; Statistics and Mathematics; Strategic and Performance Management; and Circular Economy.

3.2 Data Collection

Two separate semi-structured interviews were used to collect empirical data. The first part of the interview was used to collect data regarding researchers' experiences and attitudes on common basic ethical principles, approaches, and practices used by EU-funded R&D projects (in which they participated) and how they perceive the main obstacles during the ethics assessment of R&D projects. In the next step, we inform the researchers about the framework for the ethics assessment of R&D and provide them with CWA 17145-1 and CWA 17145-2. The second part of the interview questions was used to collect data on researchers' perceptions of the usefulness of the CWAs and the framework and their attitudes toward standards (and related documents) and standardisation.

3.3 Data Analysis

The qualitative content and relational data analysis proceeded in three steps: (1) the identification of critical incidents and codification of responses provided by the respondents, (2) the analysis of content and relations and (3) the clustering of the codes into groups.

4 Results and Discussion

4.1 How do researchers perceive the main obstacles during the ethics assessment of R&D projects?

Although all our respondents have participated in preparing multiple project proposals, not all have gained experience in the ethics assessments of R&D projects, suggesting that the ethics assessment and information related to ethical aspects of R&D projects were not deployed among all members of the consortia. Five of our respondents denied any obstacles. The perceptions of other participants suggest the following results:

› Ethics assessment of R&D should consider uncertainty in research and science. Our respondents claim:

"The main obstacle is that scientific outcome is unpredictable and, in most cases, novel (compared to other business areas where one can promise and deliver an outcome). Thus, any issue that arises should be related to a similar (not the same) issue in the past to assess the situation".

"Another obstacle is the fact that ethical issues are sensitive, and any decision made influences an individual much more than other common violations".

› Ethics assessment is perceived as a legal issue (e.g., *"main obstacles were searching for the appropriate regulations that the project is mandatory to follow"*) or an administrative issue (e.g., *"ethical board provided me with all documents I needed"* or *"there was no transparent procedure when applying for projects"*).
› Ethics assessment is perceived as a burden. Four respondents mentioned ethics assessment's administrative aspect, claiming it is all about *"bureaucracy"* or *"administrative procedures"*.
› Ethics assessment of the R&D projects is perceived as someone else's job. It can be seen in statements, such as: *"During the writing of the project proposal, the principal investigator used personal contacts and contacted an expert in the field*

of ethical assessment to help us complete the part of the project documentation related to ethical assessment" and *"it should be provided institutional or private help in doing the ethical assessment".*

Our results confirm that societal needs are mostly underestimated, and that scientific expertise dominates decision-making in R&D projects consortia. In this context, our study provides results similar to those of Burget, Bardone and Pedaste (2017). The need to involve society early in the research process can be fulfilled in many ways. The following research question can provide us with more insights into the question wheather the standards (or standards-like documents) are suitable for this task.

4.2 What are researchers' attitudes towards standards-like documents based on their perception of CWAs as a tool for the ethics assessment of R&D projects?

Our respondents perceived standards and standardisation differently. Researchers from social sciences and statistics perceived standards (standardisation) as positive. Some examples of their statements are:

› *"By standardising the ethics assessment process, standards can help to promote consistency and transparency in decision-making, which can enhance the credibility and legitimacy of R&D".*
› *"Standardisation can be beneficial for the ethics assessment of R&D projects".*
› *"Any standardisation and framework is a good starting point for assessing various needs".*
› *"Framework is very useful for project implementation in various research areas. Its uniformness is its biggest advantage".*
› *"Standards and standardisation are extremely important for the ethics assessment of projects since they provide the informative framework for evaluating the ethical issues in conducting the projects".*
› *"Standards in EIA can improve assessment significantly".*

Practical explanations in the Annex E of CWA are particularly positively perceived (e.g., *"methods for ethical impact analysis given in Annex E of CWA 17145-2 is valuable for EIA"*).

However, our respondents would like to see the document in a more practical shape (*"It is a valuable tool for EIA but should be made available via an Excel sheet (at least) to the general population"*).

Also, researchers from technical disciplines (such as ICTs or physics) doubted that one solution could fit all. These researchers seem reluctant to widen their interest in their other activities, and they are highly attached to their own disciplines. For example:

› *"It largely depends on the project topic(s). EIA is more useful in some specific projects (e.g., those related to people, animals, drugs...), but can be less useful if the project is related to quantum physics".*
› *"All the proposed documents are very useful for project management and principal investigators. However, I am sceptical that a principal investigator from a field such as IT or Engineering is qualified to use standard and complete the proposed assessment adequately".*
› *"Standards should be domain specific since some questions are unrelated to all the research areas".*

The free spirit of scientific research is seen as opposed to standardisation, as our respondent claims: "*Strict formalisation of the scientific process is negative, as science requires more time and experimentation to produce an outcome compared to business uses*". This seems to suggest that our respondents did not quite understand the issue at hand because it's not about constricting research but about providing a universal tool to evaluate aspects of it. However, the question still remains. Does one size fit all?

Our respondents agree that standards and standardisation can be valuable tools for valorisation, commercialisation, and subsequent use of research results. However, most researchers (especially the ones from mostly technical disciplines such as ICTs) are not familiar with standardisation and rarely use standards in their research projects which is why their perception of the framework provided in the CWA is mostly negative.

Maybe the solution lies (as always) in education (and training) about standardisation – standards are not enough and several researchers perceived the need for education and training: *"One needs a guidance document(s) and proper education to foresee the effects of the research and intervene if needed"* and *"it would be of greater usefulness to educate the ethical committees at faculties or universities to help researchers in these steps, review the ethical assessment [when] done and provide feedback to the PI and PM".*

Although (formal) education about standardisation should be seen as the starting point for acquiring knowledge, skills, competence, and experience in standardisation matters – researchers involved in R&D projects need continuing education (life-long learning). Still, education (and training) about standardisation must find its place in both formal education and life-long learning to have standardisation professionals who can use their knowledge about standards for valorisation, commercialisation, and subsequent use of their research results and not rely on somone else to do the standardisation work.

There seems to be a misunderstanding between researchers involved in R&D projects on who should do the ethics assessment which is why it is perceived as a legal issue, administrative issue, a burden, or someone else's job. If this continues to be the case, the ethics assessment will be done poorly or will eventually remain completely undone. If we understand the ethics assessment of R&D as a process or a path, that process must begin somewhere, and standardisation (and standards) might just be that place.

5 Conclusion

Our study aims to provide more evidence on how researchers perceive standards based on the case of the ethics assessment of R&D projects and CWA 17145-1:2017 and CWA 17145-2:2017.

Our findings give insights into the different perceptions regarding the main obstacles during the ethics assessment of R&D projects. Our respondents perceive the ethics assessment in R&D as a burden, as someone else's job, as a legal or as an administrative issue, and they argue that it should consider uncertainty in research. Our results confirm that societal needs are usually underestimated, and that scientific expertise dominates decision-making in R&D project consortia. In this context, our study provides results similar to those of Burget, Bardone and Pedaste (2017). Also, the need to involve society early in the research process can be fulfilled in many ways. Our results suggest the presence of stakeholders' asymmetry, the phenomena that focus on research results (topics) which might blur the impact on different stakeholders (Mahoney *et al.*, 2022).

Our findings reveal that our respondents perceive standards and standardisation differently. Our respondents usually don't have experience in using standards and standardisation to support the ethics assessment of R&D. Still, after introducing them to CWA 17145-1:2017 and CWA 17145-2:2017, we found that most of them perceive the given framework as useful. Regarding their attitudes toward standards (and related documents) and standardisation, most social sciences and statistics researchers perceive standards and standardisation as positive, but others felt that standards were insufficient.

Our results reveal that researchers perceive standards in the context of promoting consistency and transparency, enhancing credibility and legitimacy, providing uniformness, and being informative. However, some of our respondents would like to see the standards' recommendation in a more practical shape – like an Excel sheet. Our study reveals that researchers from technical disciplines doubt that one solution would fit all and perceive standards-like documents (CWA) as too generic and not easy to follow,

and they also need training or guidance to use these document(s). A negative perception of standardisation is observed in the context of "strict formalisation" and the need for more time for experimentation to produce an outcome compared to business uses.

Our results suggest that making standards and standardisation closer to researchers should be done in several ways: first, by making them familiar with the basics of strategic aspects of standardisation, second, by making standardisation closer to them (in their core disciplines), and third, by underlining the impact of standardisation on the limitation of stakeholder asymmetry.

The limitations of our study are based on the sample and the fact that all participants come from the University of Belgrade. Continuing our study, we will tend to enhance our sample with researchers from other faculties and universities, and other countries. Also, as the European standardisation system differs significantly from the system in the USA or China, our future studies could involve researchers from not only Europe, but the USA or China, and the comparison between these standardisation systems (and the researchers' experience with defining the ethical aspects of their research projects) could be conducted. Considering that the ethics assessment and information related to ethical aspects of R&D projects are not deployed among all members of the consortia, different members of the consortia have different attitudes and perceptions – our future studies could examine the perceptions of several members from consortia (or consortia as a whole) as this might be significant for standardisation practitioners and experts in the field.

References

Abdelkafi, N. et al. (2021) 'Understanding ICT Standardization', Etsi, 2.

Bose, U. (2012) 'An ethical framework in information systems decision making using normative theories of business ethics', Ethics and Information Technology, 14(1), pp. 17–26. Available at: https://doi.org/10.1007/s10676-011-9283-5.

Brey, P. et al. (2017) 'The Ethical Assessment of Research and Innovation – A Reflection on the State of the Art (Based on Findings of the SATORI Project)', Finding Common Ground: Consensus in Research Ethics Across the Social Sciences, 1, pp. 185–198.

Brey, P.A.E. (2012a) 'Anticipating ethical issues in emerging IT', Ethics and Information Technology, 14(4), pp. 305–317. Available at: https://doi.org/10.1007/s10676-012-9293-y.

Brey, P.A.E. (2012b) 'Anticipatory Ethics for Emerging Technologies', NanoEthics, 6(1), pp. 1–13. Available at: https://doi.org/10.1007/s11569-012-0141-7.

Burget, M., Bardone, E. and Pedaste, M. (2017) 'Definitions and Conceptual Dimensions of Responsible Research and Innovation: A Literature Review', Science and Engineering Ethics, 23(1), pp. 1–19. Available at: https://doi.org/10.1007/s11948-016-9782-1.

Cargill, C.F. (2011) 'Why Standardization Efforts Fail', Journal of Electronic Publishing, 14(1). Available at: https://doi.org/https://doi.org/10.3998/3336451.0014.103.

CEN (2017a) CWA 17145-1 Ethics assessment for research and innovation - Part 1: Ethics committee.

CEN (2017b) CWA 17145-2 Ethics assessment for research and innovation - Part 2: Ethical impact assessment framework.

CEN/CENELEC. (2020), CEN/CENELEC Guide 29 – CEN/CENELEC workshop agreements – A rapid way to standardisation. Accessed on January 23, 2023. Retrieved from: https://www.cencenelec.eu/media/Guides/CEN-CLC/cenclcguide29.pdf.

CEN/CENELEC. (2022). Internal Regulations Part 2, Common Rules For Standardization Work, Brussels – Belgium, Accessed on January 23, 2023. Retrieved from: https://boss.cen.eu/media/BOSS%20CENELEC/ref/ir2_e.pdf.

European Commission (2002) 'The Sixth Framework Programme in brief', Brussels: European Commission, (December 2002), p. 22. Available at: http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:The+Sixth+Framework+Programme+in+brief#0.

European Commission (2021) 'Regulation (EU) 2021/695 of the European Parliament and of the Council of 28 April 2021 establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination, and repealing Regulati', Official Journal of the European Union, L 119(March), p. 16.

European Commission (2023) COMMISSION RECOMMENDATION (EU) 2023/498 of 1 March 2023 on a Code of Practice on standardisation in the European Research Area. Available at: https://doi.org/10.1890/0012-9623(2008)89[332:po]2.0.co;2.

Gwizdała, J.P. and Śledzik, K. (2017) 'Responsible Research and Innovation in the Context of University Technology Transfer', Acta Universitatis Lodziensis. Folia Oeconomica, 2(328), pp. 55–73. Available at: https://doi.org/10.18778/0208-6018.328.04.

Mahoney, J. et al. (2022) 'Ethical considerations in social media analytics in the context of migration: lessons learned from a Horizon 2020 project', Research Ethics, 18(3), pp. 226–240. Available at: https://doi.org/10.1177/17470161221087542.

Reijers, W. et al. (2018) 'Methods for Practising Ethics in Research and Innovation: A Literature Review, Critical Analysis and Recommendations', Science and Engineering Ethics, 24(5), pp. 1437–1481. Available at: https://doi.org/10.1007/s11948-017-9961-8.

Riley, D. (2013) 'Hidden in Plain View: Feminists Doing Engineering Ethics, Engineers Doing Feminist Ethics', Science and Engineering Ethics, 19(1), pp. 189–206. Available at: https://doi.org/10.1007/s11948-011-9320-0.

SATORI (2017) CWA part 1 released. Available at: https://satoriproject.eu/publications/cwa-part-1/.

Viseu, A. and Maguire, H. (2012) 'Integrating and Enacting "Social and Ethical Issues" in Nanotechnology Practices', NanoEthics, 6(3), pp. 195–209. Available at: https://doi.org/10.1007/s11569-012-0162-2.

Winkler, E.C., Hiddemann, W. and Marckmann, G. (2011) 'Ethical assessment of life-prolonging treatment', The Lancet Oncology, 12(8), pp. 720–722. Available at: https://doi.org/10.1016/S1470-2045(11)70148-6.

Zwart, H., Landeweerd, L. and van Rooij, A. (2014) 'Adapt or perish? Assessing the recent shift in the European research funding arena from "ELSA" to "RRI"', Life Sciences, Society and Policy, 10(1), pp. 1–19. Available at: https://doi.org/10.1186/s40504-014-0011-x.

Digital Transformation: How Management Consultancies Frame It?

Anup Sam Ninan

International University of Applied Sciences, Berlin, Germany

Abstract. Digital transformation is a process and outcome that comprises of an assemblage of actors, practices, and technologies, each possibly with diverse interpretations and expectations. Premised on the actor-network theory (ANT) methodological orientation of tracing and studying the actions and enactments of actors within a network of interrelations, this article is a cursory glance at the conceptualization of digital transformation by management consultants/ consultancies, who are significant but relatively unexplored actants within the ongoing digital technology transitions.

To study how management consultancies frame digital transformation, this work situates two distinct strands of scientific literature. Firstly, it makes an overview of the contemporary discussions on what constitutes digital transformation. Secondly, it explores the progressively increasing role that management consulting firms play in the realm of public and private organizations, which, in turn, deeply transform organizational and social ordering. From this vantage point, the paper empirically investigates the advisory prescriptions proposed by big consultancy firms in the field of digital transformation, based on qualitative document analysis of publications, reports and whitepapers brought out by some of the leading management consultancies.

Digital transformation is pervasive and disruptive in the domains of technology, economy, society, and politics. However, it appears that management consultancies, while providing guidance to both private and public organizations, have a constricted perspective on digital transformation, primarily viewing it as a form of business innovation. Thereby, they externalize some of the quite profound implications of digital transformation as illustrated in the case of predictive policing implemented in several smart cities.

1 Digital Transformation and Consultants

Digital Transformation is a multivalent phenomenon that encompasses several domains of knowledge, practices, locations, applications, usages, and translations. It involves the interconnectedness of different fields of knowledge, techniques, and approaches, creating networks of interrelations between organizations, groups of individuals, and entire societies (Ancillai et al., 2023; Hanelt et al., 2021; Kraus et al., 2021; Plekhanov et al., 2022; Verhoef et al., 2021; Vial, 2019). This opens up a variety of areas to examine the varying changes that fall under digital transformation.

This essay aims to understand one of the least explored areas within this discussion, which is on how management consultants, an influential set of actors in the field, formulate and possibly orchestrate digital transformation in certain specific ways. To comprehend the multivalent nature of digital transformation and how consultants play a significant role in digital transformation with far-reaching implications, at first we identify the case of smart cities, that exemplify the very nature and facets of digital transformation.

1.1 Smart City as Digital Transformation

A smart city is an urban system that employs technologically integrated innovative solutions, especially those based on the Internet of Things (IoT), artificial intelligence, big data, and cloud computing technologies to seamlessly connect different components and layers of a city (Kim, 2022; Kirimtat et al., 2020; Vial, 2019). From efficiently using existing urban infrastructure to providing new 'smart' services, smart cities across different countries or even between the regions of a country can be heterogenous, varying in their scope, structure, functions, and imaginaries (Albino et al., 2015; Shelton, 2017; Vial, 2019). A smart city utilizes sensors to collect data from various sources, possibly including citizens, devices, buildings, and infrastructures, to provide efficient management of resources and services, and to improve operations across different functional areas like transportation, utilities, security, education, healthcare, and so on. It is indeed "the epitome of digital ubiquity transforming our spaces, lives and ourselves through data, algorithms and smartphones" (Datta and Odendaal, 2019).

A smart city builds interoperable networks of interrelations of technologies and services that can integrate a diverse constellation of public, private, and administrative actors on a layered modular architecture (Yoo et al., 2010). A technical module, for instance, may consist of sensing, transmission, data management, and the application layers (Singh et al., 2022). To effectively implement the technical and functional aspects of smart cities, each of these layers utilize various expertise and technologies.

1.2 Role of Consultants in Smart Cities

External consultants play a crucial role in strategic planning, technology evaluation, project management, stakeholder engagement, data analytics, privacy and security, performance monitoring, knowledge transfer and so on in the context of a smart city. Expertise of the consultants is often used by smart cities to leverage technology and data to improve infrastructure, enhance services, drive sustainable growth etc. (Chakravarty et al., 2022). Consultants, due to the nature of their work, most often rely on a stack of existing tools and technologies to effectively meet their mandates (Bessant and Rush, 1995). Their work is layered, fragmented and self-contained to the specific operational parameters. For example, predictive policing is increasingly integrated into smart cities to manage with law and order situations (Tulumello and Iapaolo, 2022). A consultant may find an algorithmic tool, like *PredPol* (now rechristened as *Geolitica*), very effective for predictive policing (Huet, 2015). It can analyse various types of data, such as crime statistics, historical patterns, and demographic information, to identify potential crime hotspots and patterns. This information can then be used to allocate law enforcement resources effectively, anticipate criminal activity, and prevent crime within a city. A service like PredPol is an attractive proposition for law-and-order agencies, policy makers and administrators to deal with security challenges in an optimized resource allocation. In essence, by recommending the tool, the consultant does a very good job. Unsurprisingly, as usage reports suggest, it is widely adopted. The implication, however, as increasingly being evident, is that algorithms for predictive policing can be gravely biased. It can discriminate against specific sections of the population based on their colour, ethnic identity or economic status, and favour those who are privileged (Lash, 2021). Besides bias and discrimination, there are concerns related to privacy and transparency (Alikhademi et al., 2022). Furthermore, the effectiveness of these tools to prevent crime is rather questionable (Hunt et al., 2014; Meijer and Wessels, 2019; Tulumello and Iapaolo, 2022).

Thus, the implications of using a specific tool for predictive policing are prolonged and far-reaching for affected people, societies, and governance. However, the evaluation of the tool's implementation and effectiveness, as well as the assessment of the consultant who proposed it, are assumed to be short-term and immediate, based on internal functional logic. The fragmentation of the layered modules makes the immediate, functional enactments of the components obfuscate the overall effects and the emergent implications. Thus, many a time, despite performing presumably significant tasks, the job of a consultant may encompass only in fragments. For instance, the deliverables for the consultants sometimes only be the strategy or vision document, leaving the execution for

other agencies (Baraka, 2021) which may employ other consultants. It is this nature of the work of consultants and the ramifications of it lead to the questions on the broader framing digital transformation by these significant actors.

1.3 Digital Transformation and Management Consultants

While the consultants in the field of digital transformation are not just to management consultants or consultancies, they are the institutional actors who play a major role in formulating digital transformation both in public and private sectors. By looking into how the management consultancies conceptualize digital transformation, what we aim to problematize is on how these framings of digital transformation are ingrained with certain specific notions of envisioning, structuring, and governing of the technological infrastructure and systems, and thereby, the economic, social and political ordering. On a broader level, this may eventually help us to understand whether these enactments are a 'disciplinary strategy' (Vanolo, 2014). While situated in this broad purview, however, the focus of this work is limited and specific. Oriented from the Actor-Network Theory (ANT) approach to follow the actors, this paper empirically investigates the thematic and advisory recommendations put forth by major consultancy firms in the field of digital transformation. The study conducted qualitative document analysis of published reports, dossiers, and whitepapers from leading management consultancies, namely the "Big Three" consulting firms (McKinsey & Co, Bain & Co, and Boston Consulting Group), and the "Big Four" accounting firms (Deloitte, Ernst & Young, KPMG, and PwC). It also considers publications from Accenture and SAP, both of whom are very active in the field of digital transformation. By analysing the documents, the study exploratively investigates the broadly shared framing of digital transformation by these firms that can possibly foreground future empirical studies to explore discourses and practices.

The structure of this article is as follows: firstly, it explores the definitions of three distinct terms widely used in academic and business literature to describe ongoing digital changes—digitization, digitalization, and digital transformation. The subsequent section provides an overview of academic contributions that examine management consultancies and management consultants. Following this, the article delves into the conceptual framing of digital transformation as proposed by management consultancies. The final section analyzes the implications of management consultancies' framing, concluding with a generalization and limitations.

2 Digitization, Digitalization and Digital Transformation

To better understand how management consultancies conceptualize and frame digital transformation, it is crucial to clarify how the definitions of digitization, digitalization, and digital transformation are used in this work. This is particularly important due to the inconsistent and unclear usage of these terms among practitioners and analysts (Vial, 2019).

2.1 Digitization

Digitization is the process of converting analogue information into a digital form, represented by binary code (zeros and ones), to enable computers to store, manipulate, and transmit information, and thereby, transforming material and static things to digital, interactive, and potentially to customizable formats. In practical terms, it is rather straightforward as converting a physical paper document into a scanned digital copy or transforming a sound recording into digital bytes. It also encompasses transitioning processes from manual to digital, as Gobble (2018) notes, for instance, replacing hand-filled forms with online versions that go directly to a database. It is more of digitizing documentation processes rather than developing value-added activities beyond its immediate purview (Gobble, 2018; Li et al., 2016; Verhoef et al., 2021; Yoo et al., 2010). Digitization of information enables a transformation in products, shifting them from being material and static to becoming interactive and customizable, allowing them to create value in a non-centralized manner (Schmidt et al., 2016).

Digitization is often seen as a prerequisite for digital transformation. Verhoef et al. (2021) conceptualize digitization as the first phase of digital transformation where the 'material process of converting analogue streams of information into digital bits' (Brennen and Kreiss, 2016) takes place, subsequently leading to digitalization and digital transformation.

2.2 Digitalization

While digitization is used rather uniformly, the range of meanings for the term digitalization varies rather significantly across academic and business literature. In business and management studies, digitalization refers to the process of adopting digital technologies and incorporating them into various aspects of an organization's operations, products, or services. According to this understanding, digitalization primarily focuses on digitization that enable the storage, processing, and transmission of data electronically together with the implementation of digital tools, and the utilization of data for improved efficiency and accessibility. Digitalization is about transitioning towards a digital-centric business approach and developing innovative business frameworks, value creation and

consumption patterns that blur the boundaries between the digital and physical realms (Piepponen et al., 2022). In essence, it is about leveraging technology to streamline operations and enhance existing processes, utilizing digital technologies to transform a business and create fresh avenues for generating revenue and value.

2.3 Digital Transformation

In most business and management studies, digital transformation is understood as a broader organizational change that goes beyond the adoption of digital technologies (Fernandez-Vidal et al., 2022). It is often referred to as a strategic shift in mindset, culture, and business processes to leverage the full potential of digital technologies in achieving business objectives and creating new value. Digital transformation encompasses multiple dimensions, such as organizational and cultural change, process reengineering, innovation, and the development of new business models. Most often it means the integration of digital technologies across the entire value chain and across different functions and departments within an organization. It entails a comprehensive and holistic approach to utilizing digital technologies, including digitalization as one of its components (Piepponen et al., 2022). Digital transformation literature also emphazises the need for a strategic vision, strong leadership and cross-functional collaboration, extending its focus beyond technology to the transformation of people, processes, and organizational structures to create a digitally mature and adaptive organization (Hanelt et al., 2021; Verhoef et al., 2021).

Recent reviews from business and management indicate that it is more appropriate to view digitization, digitalization and digital transformation as sequential phases (Piepponen et al., 2022; Verhoef et al., 2021). The first phase, digitization, denotes the shift from analogue to digital information. Digitalization, which is the second phase, encompasses the adoption and integration of digital technologies into existing business and organizational process, including automating processes, retraining personnel etc. Both these phases are technology driven and often implemented as projects. The third phase, digital transformation represents a broader organizational change brought about by digital technologies, ultimately resulting in new or revised business models, processes, and customer experiences. Digital transformation is not project or technology driven but refers to strategy driven changes leading to transformation of organizations. While social dimension of digital transformation is identified as an area of analyzis, business studies overwhelmingly emphazis on technological and organizational aspects (Reis and Melão, 2023).

All these three terms – digitization, digitalization and digital transformation – do not have such nuanced difference in social science literature, and are often used interchangeably. Digitalization, the most used term, focusses on the social and organizational reordering due to the proliferation of new actors, institutional arrangements, opportunities and vulnerabilities. While most business and management literature is overwhelmingly optimistic about digital transformation, social science literature finds it Janus-faced (Shriwise, 2022) by looking into the potential and the pitfalls of ongoing digitally mediated changes. For instance, a great deal of studies looks at how digital technologies facilitate formation of new classes, different kinds of social inclusion and exclusion that is proliferated on the basis of social measurement, differentiation, and hierarchy (Burrell and Fourcade, 2021; Fourcade, 2021). A number of studies look into how digitalization is influencing structural changes through its impacts on productivity, employment, sectoral linkages, trade, labour, nature of work and the ways the state handle labour, how existing work gets disrupted – leading to specific effects in employment, working conditions, politics and economy (Fussey and Roth, 2020; Larsson and Teigland, 2020; Matthess and Kunkel, 2020). Mengay (2020), for instance, argues that digitalization has two very different effects on work. On the one hand, it leads to a re-Taylorization of work, de-qualification and a loss of workers autonomy. On the other hand, digitalization of work leads to new forms of indirect control and algorithmic control that can be used to manage and instrumentalize the supposed autonomy of workers to actually enable an unequal and exploitative labour process.

3 Management Consultancies / Consultants

Management consulting, mostly known as 'management engineering' prior to the Second World War (McKenna, 1995), is generally defined as a short-term advisory service rendered by external experts, aimed at assisting executives in enhancing the management, operations, and overall economic performance of an organization. Consultants stand out as external, temporary professionals who bring specialized experience and expertise that is not readily accessible within the client organization, best representing what is termed as adhocracy. They are highly valued for their guidance in enhancing organizational performance and educating clients in addressing future challenges, for which they are compensated (Srinivasan, 2014).

3.1 The Evolution of Management Consulting

While most scholars associate the origin of management consulting with the emergence of scientific management in the early 1900s (Kipping, 1999), McKenna (1995) argues that the origins of management consulting can be traced back to the 1890s, with the growth of large industrial organizations in the United States creating a demand for professional firms of engineers, accountants, and lawyers. Several firms like Arthur D. Little, Stone & Webster and Price Waterhouse offered independent corporate counsel to assist executives in managing the complexity of their businesses. Consulting engineers provided technical knowledge to manufacturing companies, while accounting firms conducted external audits and provided financial controls for growing corporations. This development marked a shift towards seeking specialized expertise on a consulting basis rather than employing full-time staff members. Following a period of gradual and sluggish expansion until the 1920s, these firms witnessed a notable upswing in both their reputation and accomplishments during the 1930s. The professional recognition of consulting underwent a significant transformation, for instance, in 1929 with the establishment of Association for Consulting Management Engineers (ACME), which accredited consulting organizations. Furthermore, the implementation of New Deal banking and securities regulations in the mid-1930s played a pivotal role in driving the growth of the management consulting industry (McKenna, 1995). Management engineers drew upon the practices of accountants, engineers, and lawyers to provide comprehensive studies of organizations, strategies, and operations at the executive level. The significant transformation in this emerging quasi-profession that occurred during the 1930s, predominantly influenced by political developments, according to McKenna, constitute the origins of modern management consulting. Consultants' foray to the public services majorly happened during the second world war as the US Federal Government enlisted their services to improve civilian production, restructure the military, and manage the rapid expansion of the Federal Administration (Kipping, 2021). For instance, Cresap, McCormick & Paget were hired by the Hoover Commission in 1949 to reorganize the Executive Branch. Consultants acted as intermediaries between public and private bureaucracies, facilitating the exchange of ideas and accelerating the process of organizational innovation and dissemination (McKenna, 2012, 1995). During this phase, pioneer consulting entrepreneurs began to play a vital role in the industry as well. They identified and addressed significant contradictions between existing practices and cultural norms, drawing expertise from diverse fields to propose solutions. These entrepreneurs emphasized the social benefits of their solutions and established the uniqueness of their organizations by defining social codes. Additionally, they built relationships with influential figures outside the consulting field to legitimize their problem-solving models. These institutional actions have shaped the industry, resulting in a landscape where firms are increasingly similar yet possess distinct positioning (David et al., 2013).

3.2 Management Consulting at Present

Called also as global professional service firms or professional services networks, management consultancies play a pivotal role in today's capitalist landscape. It has shown a tremendous growth in recent years. While the value of global consulting market was estimated to be of 160 billion USD in 2019, the worldwide revenues of the Big Four accounting/ audit firms itself exceeded 200 billion USD in 2022 (Statista, 2022). They contribute to the creation and spread of new business practices, linking firms, industries, and countries, and integrating them into a global framework. According to Bühlmann (2023), these firms produce 'a new corporate nobility'. Operating in nearly all countries, these leading firms provide guidance to the most influential multinational corporations on matters such as management strategies, legal affairs, mergers and acquisitions, and tax planning. Despite its significance, there are not many studies on management consultancies or on consultants until recently except in sociology of professions or organizational studies (Kipping and Kirkpatrick, 2013; Muzio et al., 2011). Management consulting industry has been largely overlooked in academic research due to several reasons as Srinivasan (2014) points out. The highly fragmented nature of the industry encompassing a diverse range of firms, the lack of formal regulation and professional bodies, the varying size, specialization, and scope, and the complex and intangible nature of their services hinders extensive research and measurement.

Consulting as a professional area is diverse. Management consultancies specialize in providing strategic and operational advice to organizations with diverse expertise, while there are consultancies focusing on specific domains such as IT, finance, human resources, marketing, sales, legal, health, education, employment, security, and environmental issues. It can be divided also on the basis of who their clients are; the size of clients (small, medium, large, multinational), sectors (private, public, international organizations) and so on. Furthermore, there are individual consultants working independently and offering personalized expertise, while consulting firms have teams of consultants with diverse skills and resources to handle larger projects.

Though the origins of the role of the consulting industry in the public sector can be traced back to the nineteenth-century United States (Kipping, 2021), there is a noted proliferation of consulting services in the public sector of late. Public institutions increasingly rely on consultancies to acquire policy knowledge, assess stakeholder dynamics, and evaluate governance systems (Eckl and Hanrieder, 2023; Seabrooke and Sending, 2022). Consultants provide them advisory services, keep them stay abreast with governance trends, offer technical and programming expertise, and perform evaluations (Seabrooke and Sending, 2020). They can be instrumental in reforming the public services (Begley and Sheard, 2019; Beveridge, 2012), developing global benchmarks (Broome, 2022) or incorporating gender equality in to organizations (Blanchard, 2022; Olivius and Rönnblom, 2019).

In this essay, we are concerned with a significant subsection of the consulting industry, the management consultancies, offering their services to both the public and private sectors, in digital transformation. It is important that we identify some of the notable characteristics of consulting industry that are relevant to our subsequent analyzis.

3.3 Characteristics of Management Consulting

In one of the early articles on the consulting industry, Turner (1982) outlines eight primary objectives of consulting profession: furnishing information to clients, resolving their issues, conducting diagnostic assessments that may involve redefining the problem, offering recommendations based on the diagnosis, assisting with the implementation of suggested solutions, fostering consensus and commitment towards corrective action, facilitating client learning by teaching them how to address similar problems in the future, and ultimately achieving long-term improvements in organizational effectiveness. In their extensive literature review, Canato and Giangreco (2011) find that management consultants fulfil multiple roles, namely serving as information sources, standard setters, knowledge brokers, and knowledge integrators. In pursuing innovation, they are the source of legitimation and locus of experience; they play a crucial role in bridging the 'managerial gap' by facilitating the absorption and assimilation of new technological inputs necessary for a successful transfer (Bessant and Rush, 1995).

Fincham et al., (2013) outline three fundamental characteristics of management consulting. Firstly, consultants help in diagnosing and/ or addressing management challenges. Secondly, consultants operate externally to the specific problem at hand and do not bear responsibility for implementation. And lastly, the support provided is temporary in nature.

The 'digital turn' in the 1990s carved out a clear future specialization for management consultancies to use information technology based organisational information systems to solve organisational problems that eventually led IT consultants as important success factors of the digital transformation projects (Bensberg et al., 2019; Bloomfield and Best, 1992; Bloomfield and Danieli, 1995). New technology based firms and the emergence of new industries (Shearman and Burrell, 1988) opened up not only the market of management consultancies but made them undergo significant changes themselves. In the digital era, the traditional face-to-face nature of management consulting, which heavily relied on personal connections, appeared to be at risk due to the rise of digital transformation and technological advancements, further compounded by the pandemic (Mamedova et al., 2022). They adapted to the changed context by embracing digitalization in varying degrees (Crișan and Marincean, 2023; Fleming, 2022).

The role of consultants in shaping public policy, especially but not just in developing countries, reveals the politicized nature of expertise, potentially undermining ideas of neutrality and legitimacy (Bock, 2014; Ylönen and Kuusela, 2019). As in the case of UK (Begley and Sheard, 2019; Raco, 2018), in general, the coevolution of the liberal reforms and the increasing influence of private sector consultants is evident. Austerity measures have prompted local authorities to adopt a more entrepreneurial approach, seeking to boost development and maximize planning gain returns. Consequently, these reforms are generating new market prospects for a burgeoning consultancy sector and gradually leading to the privatization of the planning system.

3.4 Management Consulting and the New Public Management

With the emergence of the New Public Management (NPM) in the 1980s, policymakers started to actively engage management consultants from the private sector to facilitate the reform of their bureaucracies (Saint-Martin, 1998; Seabrooke and Sending, 2022). The trend of outsourcing short-term, expert-based knowledge production is progressively supplanting the long-term efforts of civil servants and even politicians, with consultants exerting power often in an opaque and undemocratic manner. Termed as "consultocracy" (Hood and Jackson, 1991; Ylönen and Kuusela, 2019), it reduces the planning capacity of public agencies (Kirkpatrick et al., 2023). While examining the role of planning consultants in shaping public policy agendas, (Linovski, 2019) finds that private-sector consultants face competing pressures of an entrepreneurial fee-for-service business model that further complicates the already ambiguous consultant-client relationship (Werr and Styhre, 2002). In their study on consultants role in international organizations, Eckl and Hanrieder (2023) point out that consultants serve as more than just agents of managerialism; they also curate various perspectives, including their own, within reform packages, advocate for specific content, and employ practices that diminish accountability to stakeholders. While consultants actively promote their managerial concepts, seek to expand the reach of their business model and prioritize client satisfaction, their privileged access can inadvertently disempower others. Furthermore, consultants being expert knowledge workers exert varying degrees of control over both the methods and goals of service delivery (Kipping and Kirkpatrick, 2013).

Based on a comprehensive multisectoral case study conducted in Finland, Ylönen and Kuusela (2019) propose a fourfold typology to illustrate the impact of consultocracy on public administration. They point out that the growing dependence on consultants leads to the monopolization and privatization of public knowledge, resulting in dependencies, erosion of tacit knowledge, weakened accountability, and an increased emphasis on instrumental rationality.

To sum up, in order to study the framing of digital transformation by management consultants, we need to consider the basic adhoc nature of consultancy as pursued by external professionals who provide specialized expertise and project-based, problem-centred advisory services to organizations. They furnish information, resolve issues, and offer recommendations based on technocratic imaginaries and diagnostic assessments. They assist with implementation, foster consensus, and serve as sources of information, standard setters, knowledge brokers, and integrators, particularly in innovation where they bring legitimacy and expertise. However, their external position and short-term focus limit their legitimacy, accountability and responsibility for implementation.

Furthermore, the growing reliance on consultants raises concerns about the monopolization and privatization of knowledge. Dependencies on external expertise can erode tacit knowledge within organizations and weaken accountability mechanisms. This trend is further exacerbated by neoliberalism, privatization, and managerial optimization, which emphasize instrumental rationality over holistic organizational or societal considerations. The politicized nature of expertise within consulting also raises questions about the socio-economic ordering by consultancy practices, as they evaluate governance systems without addressing accountability or legitimacy concerns.

4 Digital Transformation According to Management Consultancies

As pointed out earlier, digital transformation has emerged as a significant area of work for all major consulting firms. In this section, we identify the overall themes and framing of digital transformation as put forth by several reports, white papers and dossiers from McKinsey, Bain & Co, BCG, Deloitte, E&Y, KPMG, PwC, Accenture, and SAP. While there are overlapping themes and focal areas, each firm brings its own unique understanding, specialization, and emphasis to the concept.

Overall, they characterize digital transformation as using digital technologies to integrate and optimize all aspects of a business by enabling innovation, creating new business models, and improving operational efficiency. This involves applying digital capabilities to adapt and reimagine their processes, products, and assets to enhance efficiency, customer value, risk management, and monetization opportunities.

Across the firms, there are several overlapping themes and focal areas: all acknowledge the importance of developing a clear *digital strategy and vision* aligned with business objectives. McKinsey, PwC, BCG, Deloitte, E&Y, and Bain & Company emphasize the need for a holistic digital strategy that incorporates customer-centricity, innovation, and long-term goals. They stress the importance of understanding market disruptions and identifying digital opportunities for growth. Accenture and SAP take a step further by

focusing on *Intelligent Enterprise*, where digital technologies are integrated to drive innovation, agility, and real-time decision-making.

Customer-centricity is a shared theme across all the consulting firms' reports recognizing the significance of delivering exceptional customer experiences with the help of digital technologies, data analytics, and personalization to enhance customer engagement, loyalty, and satisfaction. While the emphasis on customer-centricity is consistent, they employ different approaches to achieve it.

The strategic value of *data and analytics* is commonly recognized by all the firms. They stress the importance of investing in data management, analytics capabilities, and data-driven decision-making. The firms explore the potential of advanced analytics techniques, such as AI, machine learning, and predictive modelling, in unlocking the value of data.

Agility is a common theme. They advocate for the adoption of agile methodologies, fostering cross-functional collaboration, and creating a culture of experimentation and learning. This enables organizations to respond quickly to market changes, iterate on digital initiatives, and drive innovation.

Technology adoption and integration is central to digital transformation across all reports. The role of technologies such as cloud computing, AI, IoT, machine learning and automation are especially prevalent across the reports. They highlight the need to assess the relevance of these technologies, integrate them into operations, and build robust technology architectures.

Talent and skills development, especially acquiring and developing of digital skills by personnel are emphazised mostly across the reports. They highlight the need to attract top digital talent, upskill existing employees, and foster a culture of continuous learning and innovation. The firms device varying approaches to talent and skills development, including reskilling programs, collaboration with educational institutions, and partnerships with external experts.

The documents identify *change management and strong leadership* as critical factors for successful digital transformation. They highlight the need for effective communication, employee engagement, and cultural shifts to create a digital-first mindset.

The reports broadly recognize the social implications of digital transformation by mentioning the importance of creating an inclusive digital economy that benefits all, addressing the digital divide and inequalities, considering ethical considerations in the use of digital technologies, promoting citizen engagement and participation, and striving for environmental sustainability. Some reports address the impact of digital transformation on the workforce, advocate for reskilling and upskilling programs, and emphasize the need for ethical frameworks and responsible digital practices. They also

acknowledge the role of the public sector in driving digital transformation and advocate for effective governance and policy frameworks. There is an overall recognition that digital transformation is shaping the society and driving social change though there are rarely any emphasis beyond the parameters of business innovation and market operation.

5 Implications of Management Consultants' framing of Digital Transformation

As observed in the previous section, management consultancies mostly emphasis on business innovation and perceive digital transformation as a comprehensive endeavour that involves the integration of digital technologies and organizational adjustments. This approach places significant attention on strategic planning, innovation in business models, and the creation of enhanced customer experiences through new processes. Their primary focus is on disrupting the market environment by formulating digital strategies and visions, prioritizing customer-centricity, implementing agile methodologies, incorporating new technologies, fostering talent and skill development, and successfully managing change and leadership within organizations. This study identifies the following specific notable aspects in the framing of digital transformation:

5.1 The Neoliberal Managerial Logic of Digital Transformation

The way in which management consultancies orient digital transformation is embedded in the neoliberal managerial logic though they barely acknowledge it. This may have or result in partial and biased understanding about rights, freedom, security, work, market, consumption, spatial arrangements and so on. In the context of public sector interventions, for instance, this orientation essentializes the market logic without giving room to explore or engage with other possibilities particularly because privatization of public services and resources are ingrained in this framing of digital transformation.

Furthermore, the understanding of society is by and large restricted to as consumers who are the target of market, who are also seen as the recipients or the beneficiaries of the transitions. Issues like inclusion, digital divide and differential access are addressed from the same angle. The impact of digital transformation on the work and workforce focuses on reskilling and upskilling programs. The sections on ethics and responsible digital practices most often do not provide guidelines or frameworks to implement. The visions of future rarely foresee citizens' participation.

5.2 Digital Transformation as Universalizing Project

There is a globalizing, universalizing outlook that underly the framing of digital transformation where infrastructures, processes, and imaginaries can be drawn from a universal palette of skills, technologies and expertise without taking into account of the contextual specificities. This has far-reaching consequences with regard to who and what are included and excluded in digital transformation. It is also about who bears the cost and responsibilities of these profound changes. What is being implemented within uniformly structured business organizations are being transmitted to complex and diverse societies, cities and states that can lead to disastrous consequences (Kempeneer and Heylen, 2023).

The technocratic and managerial framing of digital transformation does not include the space for fundamental questions that may directly or indirectly connected to the wide-ranging changes it brings forth regarding equality, justice, identities, democratic participation or structural inequalities. These are absent from the pragmatic solutions that are envisioned in most of these publications.

5.3 Digital Transformation as a Technocratic Process

Thirdly, there is a great deal of techno-centrism and technological optimism in the framing of digital transformation as perceived by management consultancies. Adoption of new technologies and integrating them to the operational processes constitute the backbone of all articulations on digital transformation. Technologies are seen as value-neutral tools that could be embedded in the modular systems that results in digital transformation. The only technological vulnerability that comes out prominently in this framing is digital security.

This framing also gives a lot of importance to quantification in the assessment of digital transformation. Combined with the immediacy of fragmented, flexible, adaptable form of work, the mechanisms of quantification can play a crucial role in externalizing what is beyond the immediate measures of quantified project evaluation. By its very adhoc nature, the emphasis of the prescriptions and modes of analysis follow an internal logic which makes this framing inward-looking and self-contained.

6 Conclusion

If we contextualize the implications observed from the documents in the case of smart cities mentioned earlier in this essay, one could argue that digital transformation, as envisioned by management consultancies, underlies forms of governance ingrained with a particular way of social and political ordering. As Vanolo (2014) suggests, the emergence of novel concepts for envisioning, structuring, and governing urban environments introduces both innovative approaches to managing urban systems and a distinct ethical framework that categorizes cities as either 'desirable' or 'undesirable.' Consequently, the discourse surrounding smart cities holds the potential to exert considerable influence on shaping compliant individuals and establishing political authority. This enables the smart city narrative to function as a potent instrument for generating obedient citizens and bolstering political legitimacy. It is especially so, as Sepehr and Felt, (2023) finds in the case of the smart city in Vienna where there is a notable absence of citizen involvement in shaping these future visions. From this angle, when we analyse the 'political nature of patterns' (Kaufmann et al., 2019), prediction that happens in predictive policing, as Hong (2023) argues, is not a technological tool for predicting future outcomes, but 'a social model for extracting and concentrating discretionary power'.

This study limits itself to the framing of digital transformation by management consultancies as articulated in their published works. Of course, it is empirically important to see whether the consultations are anchored or restricted as per these definitions to see whether these reports act only as framing devices to attract clients or more meanings attached to them as in approach papers. Furthermore, concrete empirical evidence is required to understand the situated process of enactment of the framing of digital transformation. It is also important to see how these framings are embedded and leading to the structural changes that states and organizations undergo.

This paper is not mean to run against digital transformation or the role of management consultants who taking part in digital transformation. As a multivalent process and achievement, digital transformation or the role of management consultants cannot, and should not be confined into certain boxes. This is an attempt that can help us to situate the process of digital transformation in its contexts and open the black-box to develop more comprehensive ways of understanding the deep-seated changes that we undergo. It is certainly important to broaden the realm of digital transformation by incorporating the wider social, technological, political and economic questions into the framing so that it is inclusive, sustainable and meaning for people, societies and environments at large.

References

Albino, V., Berardi, U., Dangelico, R.M., 2015. Smart Cities: Definitions, Dimensions, Performance, and Initiatives. Journal of Urban Technology 22, 3–21. https://doi.org/10.1080/10630732.2014.942092

Alikhademi, K., Drobina, E., Prioleau, D., Richardson, B., Purves, D., Gilbert, J.E., 2022. A review of predictive policing from the perspective of fairness. Artif Intell Law 30, 1–17. https://doi.org/10.1007/s10506-021-09286-4

Ancillai, C., Sabatini, A., Gatti, M., Perna, A., 2023. Digital technology and business model innovation: A systematic literature review and future research agenda. Technological Forecasting and Social Change 188, 122307. https://doi.org/10.1016/j.techfore.2022.122307

Baraka, C., 2021. Kenya's first smart city promised everything. 13 years on, it's still a construction site. Rest of World.

Begley, P., Sheard, S., 2019. McKinsey and the 'Tripartite Monster': The Role of Management Consultants in the 1974 NHS Reorganisation. Medical History 63, 390–410. https://doi.org/10.1017/mdh.2019.41

Bensberg, F., Buscher, G., Czarnecki, C., 2019. Digital Transformation and IT Topics in the Consulting Industry: A Labor Market Perspective, in: Nissen, V. (Ed.), Advances in Consulting Research: Recent Findings and Practical Cases, Contributions to Management Science. Springer International Publishing, Cham, pp. 341–357. https://doi.org/10.1007/978-3-319-95999-3_16

Bessant, J., Rush, H., 1995. Building bridges for innovation: the role of consultants in technology transfer. Research Policy 24, 97–114. https://doi.org/10.1016/0048-7333(93)00751-E

Beveridge, R., 2012. Consultants, depoliticization and arena-shifting in the policy process: privatizing water in Berlin. Policy Sciences 45, 47–68. https://doi.org/10.1007/s11077-011-9144-4

Blanchard, S., 2022. Feminism through the market? A study of gender-equality consultants in France. Gender, Work & Organization 29, 443–465. https://doi.org/10.1111/gwao.12770

Bloomfield, B.P., Best, A., 1992. Management Consultants: Systems Development, Power and the Translation of Problems. The Sociological Review 40, 533–560. https://doi.org/10.1111/j.1467-954X.1992.tb00401.x

Bloomfield, B.P., Danieli, A., 1995. The Role of Management Consultants in the Development of Information Technology: The Indissoluble Nature of Socio-Political and Technical Skills. Journal of Management Studies 32, 23–46. https://doi.org/10.1111/j.1467-6486.1995.tb00644.x

Bock, S., 2014. Politicized expertise – an analysis of the political dimensions of consultants' policy recommendations to developing countries with a case study of McKinsey's advice on REDD+ policies. Innovation: The European Journal of Social Science Research 27, 379–397. https://doi.org/10.1080/13511610.2013.864228

Boussebaa, M., Faulconbridge, J.R., 2019. Professional service firms as agents of economic globalization: A political perspective. Journal of Professions and Organization 6, 72–90. https://doi.org/10.1093/jpo/joy014

Brennen, J.S., Kreiss, D., 2016. Digitalization, in: The International Encyclopedia of Communication Theory and Philosophy. John Wiley & Sons, Ltd, pp. 1–11. https://doi.org/10.1002/9781118766804.wbiect111

Broome, A., 2022. Gaming country rankings: Consultancies as knowledge brokers for global benchmarks. Public Administration 100, 554–570. https://doi.org/10.1111/padm.12809

Bühlmann, F., 2023. Professional service firms and the manufacturing of the corporate nobility. Journal of Professions and Organization 10, 36–49. https://doi.org/10.1093/jpo/joad003

Burrell, J., Fourcade, M., 2021. The Society of Algorithms. Annual Review of Sociology 47, 213–237. https://doi.org/10.1146/annurev-soc-090820-020800

Canato, A., Giangreco, A., 2011. Gurus or Wizards? A Review of the Role of Management Consultants. European Management Review 8, 231–244. https://doi.org/10.1111/j.1740-4762.2011.01021.x

Chakravarty, S., Bin Mansoor, M.S., Kumar, B., Seetharaman, P., 2022. Challenges of consultant-led planning in India's smart cities mission. Environment and Planning B: Urban Analytics and City Science 23998083221137080. https://doi.org/10.1177/23998083221137078

Crișan, E.L., Marincean, A., 2023. The digital transformation of management consulting companies: a review. Inf Syst E-Bus Manage. https://doi.org/10.1007/s10257-023-00624-4

Datta, A., Odendaal, N., 2019. Smart cities and the banality of power. Environment and Planning D: Society and Space 37, 387–392. https://doi.org/10.1177/0263775819841765

David, R.J., Sine, W.D., Haveman, H.A., 2013. Seizing Opportunity in Emerging Fields: How Institutional Entrepreneurs Legitimated the Professional Form of Management Consulting. Organization Science 24, 356–377. https://doi.org/10.1287/orsc.1120.0745

Eckl, J., Hanrieder, T., 2023. The political economy of consulting firms in reform processes: the case of the World Health Organization. Review of International Political Economy 0, 1–24. https://doi.org/10.1080/09692290.2022.2161112

Fernandez-Vidal, J., Antonio Perotti, F., Gonzalez, R., Gasco, J., 2022. Managing digital transformation: The view from the top. Journal of Business Research 152, 29–41. https://doi.org/10.1016/j.jbusres.2022.07.020

Fincham, R., Mohe, M., Seidl, D., 2013. Guest Editors' Introduction. International Studies of Management & Organization 43, 3–10. https://doi.org/10.2753/IMO0020-8825430300

Fleming, P., 2022. "Never Let a Good Crisis Go to Waste": How Consulting Firms Are Using COVID-19 as a Pretext to Transform Universities and Business School Education. AMLE AMLE_20220217. https://doi.org/10.5465/amle.2022.0217

Fourcade, M., 2021. Ordinal citizenship. The British Journal of Sociology 72, 154–173. https://doi.org/10.1111/1468-4446.12839

Fussey, P., Roth, S., 2020. Digitizing Sociology: Continuity and Change in the Internet Era. Sociology 54, 659–674. https://doi.org/10.1177/0038038520918562

Gobble, M.M., 2018. Digitalization, Digitization, and Innovation. Research-Technology Management 61, 56–59. https://doi.org/10.1080/08956308.2018.1471280

Hanelt, A., Bohnsack, R., Marz, D., Antunes Marante, C., 2021. A Systematic Review of the Literature on Digital Transformation: Insights and Implications for Strategy and Organizational Change. Journal of Management Studies 58, 1159–1197. https://doi.org/10.1111/joms.12639

Hong, S., 2023. Prediction as extraction of discretion. Big Data & Society 10, 20539517231171052. https://doi.org/10.1177/20539517231171053

Hood, C., Jackson, M., 1991. Administrative Argument. Dartmouth Publishing Co Ltd, Aldershot, Hants, England ; Brookfield, Vt., USA.

Huet, E., 2015. Server And Protect: Predictive Policing Firm PredPol Promises To Map Crime Before It Happens. Forbes.

Hunt, P., Saunders, J., Hollywood, J.S., 2014. Evaluation of the Shreveport Predictive Policing Experiment (Evaluation report No. 248883).

Kaufmann, M., Egbert, S., Leese, M., 2019. Predictive Policing and the Politics of Patterns. The British Journal of Criminology 59, 674–692. https://doi.org/10.1093/bjc/azy060

Kempeneer, S., Heylen, F., 2023. Virtual state, where are you? A literature review, framework and agenda for failed digital transformation. Big Data & Society 10, 20539517231160530. https://doi.org/10.1177/20539517231160528

Kim, J., 2022. Smart city trends: A focus on 5 countries and 15 companies. Cities 123, 103551. https://doi.org/10.1016/j.cities.2021.103551

Kipping, M., 2021. America First: How Consultants Got into the Public Sector, in: Hurl, C., Vogelpohl, A. (Eds.), Professional Service Firms and Politics in a Global Era: Public Policy, Private Expertise. Springer International Publishing, Cham, pp. 29–52. https://doi.org/10.1007/978-3-030-72128-2_2

Kipping, M., 1999. American Management Consulting Companies in Western Europe, 1920 to 1990: Products, Reputation, and Relationships. The Business History Review 73, 190–220. https://doi.org/10.2307/3116240

Kipping, M., Kirkpatrick, I., 2013. Alternative Pathways of Change in Professional Services Firms: The Case of Management Consulting. Journal of Management Studies 50, 777–807. https://doi.org/10.1111/joms.12004

Kirimtat, A., Krejcar, O., Kertesz, A., Tasgetiren, M.F., 2020. Future Trends and Current State of Smart City Concepts: A Survey. IEEE Access 8, 86448–86467. https://doi.org/10.1109/ACCESS.2020.2992441

Kirkpatrick, I., Sturdy, A.J., Reguera Alvarado, N., Veronesi, G., 2023. Beyond hollowing out: Public sector managers and the use of external management consultants. Public Administration Review 83, 537–551. https://doi.org/10.1111/puar.13612

Kraus, S., Jones, P., Kailer, N., Weinmann, A., Chaparro-Banegas, N., Roig-Tierno, N., 2021. Digital Transformation: An Overview of the Current State of the Art of Research. SAGE Open 11, 21582440211047576. https://doi.org/10.1177/21582440211047576

Larsson, A., Teigland, R. (Eds.), 2020. The Digital Transformation of Labor: Automation, the Gig Economy and Welfare. Routledge, London. https://doi.org/10.4324/9780429317866

Lash, A.S., Dhruv Mehrotra, Surya Mattu, Dell Cameron, Annie Gilbertson, Daniel Lempres, and Josh, 2021. Crime Prediction Software Promised to Be Bias-Free. New Data Shows It Perpetuates It. Gizmodo. URL https://gizmodo.com/crime-prediction-software-promised-to-be-free-of-biases-1848138977 (accessed 6.17.23).

Li, F., Nucciarelli, A., Roden, S., Graham, G., 2016. How smart cities transform operations models: a new research agenda for operations management in the digital economy. Production Planning & Control 27, 514–528. https://doi.org/10.1080/09537287.2016.1147096

Linovski, O., 2019. Shifting Agendas: Private Consultants and Public Planning Policy. Urban Affairs Review 55, 1666–1701. https://doi.org/10.1177/1078087417752475

Mamedova, I.A., Savchenko-Belsky, V., Velesco, S., 2022. Management Consulting in Digital Era, in: Ashmarina, S.I., Mantulenko, V.V., Vochozka, M. (Eds.), Proceedings of the International Scientific Conference "Smart Nations: Global Trends In The Digital Economy," Lecture Notes in Networks and Systems. Springer International Publishing, Cham, pp. 430–437. https://doi.org/10.1007/978-3-030-94873-3_54

Matthess, M., Kunkel, S., 2020. Structural change and digitalization in developing countries: Conceptually linking the two transformations. Technology in Society 63, 101428. https://doi.org/10.1016/j.techsoc.2020.101428

McKenna, C., 2012. Strategy Followed Structure: Management Consulting and the Creation of a Market for "Strategy," 1950–2000, in: J. Kahl, S., S. Silverman, B., A. Cusumano, M. (Eds.), History and Strategy, Advances in Strategic Management. Emerald Group Publishing Limited, pp. 153–186. https://doi.org/10.1108/S0742-3322(2012)0000029010

McKenna, C.D., 1995. The Origins of Modern Management Consulting. Business and Economic History 24, 51–58.

Meijer, A., Wessels, M., 2019. Predictive Policing: Review of Benefits and Drawbacks. International Journal of Public Administration 42, 1031–1039. https://doi.org/10.1080/01900692.2019.1575664

Mengay, A., 2020. Digitalization of work and heteronomy. Capital & Class 44, 273–285. https://doi.org/10.1177/0309816820904032

Mergel, I., Edelmann, N., Haug, N., 2019. Defining digital transformation: Results from expert interviews. Government Information Quarterly 36, 101385. https://doi.org/10.1016/j.giq.2019.06.002

Muzio, D., Kirkpatrick, I., Kipping, M., 2011. Professions, organizations and the state: Applying the sociology of the professions to the case of management consultancy. Current Sociology 59, 805–824. https://doi.org/10.1177/0011392111419750

Olivius, E., Rönnblom, M., 2019. In the business of feminism: consultants as Sweden's new gender-equality workers. European Journal of Politics and Gender 2, 75–92. https://doi.org/10.1332/251510819X15471289106103

Piepponen, A., Ritala, P., Keränen, J., Maijanen, P., 2022. Digital transformation of the value proposition: A single case study in the media industry. Journal of Business Research 150, 311–325. https://doi.org/10.1016/j.jbusres.2022.05.017

Plekhanov, D., Franke, H., Netland, T.H., 2022. Digital transformation: A review and research agenda. European Management Journal. https://doi.org/10.1016/j.emj.2022.09.007

Raco, M., 2018. Private Consultants, Planning Reform and the Marketisation of Local Government Finance, in: Planning Practice. Routledge.

Reis, J., Melão, N., 2023. Digital transformation: A meta-review and guidelines for future research. Heliyon 9, e12834. https://doi.org/10.1016/j.heliyon.2023.e12834

Saint-Martin, D., 1998. The New Managerialism and the Policy Influence of Consultants in Government: An Historical–Institutionalist Analysis of Britain, Canada and France. Governance 11, 319–356. https://doi.org/10.1111/0952-1895.00074

Sandhu, A., Fussey, P., 2021. The 'uberization of policing'? How police negotiate and operationalise predictive policing technology. Policing and Society 31, 66–81. https://doi.org/10.1080/10439463.2020.1803315

Schmidt, R., Zimmermann, A., Möhring, M., Nurcan, S., Keller, B., Bär, F., 2016. Digitization – Perspectives for Conceptualization, in: Celesti, A., Leitner, P. (Eds.), Advances in Service-Oriented and Cloud Computing, Communications in Computer and Information Science. Springer International Publishing, Cham, pp. 263–275. https://doi.org/10.1007/978-3-319-33313-7_20

Seabrooke, L., Sending, O.J., 2022. Consultancies in public administration. Public Administration 100, 457–471. https://doi.org/10.1111/padm.12844

Seabrooke, L., Sending, O.J., 2020. Contracting development: managerialism and consultants in intergovernmental organizations. Review of International Political Economy 27, 802–827. https://doi.org/10.1080/09692290.2019.1616601

Sepehr, P., Felt, U., 2023. Urban Imaginaries as Tacit Governing Devices: The Case of Smart City Vienna. Science, Technology, & Human Values 01622439231178597. https://doi.org/10.1177/01622439231178597

Shearman, C., Burrell, G., 1988. New technology based firms and the emergence of new industries: some employment implications. New Technology, Work and Employment 3, 87–99. https://doi.org/10.1111/j.1468-005X.1988.tb00092.x

Shelton, T., 2017. The urban geographical imagination in the age of Big Data. Big Data & Society 4, 2053951716665129. https://doi.org/10.1177/2053951716665129

Shriwise, A., 2022. Global Social Policy Digest 22.3: The pros and cons of digitalization. Global Social Policy 22, 604–630. https://doi.org/10.1177/14680181221120872

Singh, T., Solanki, A., Sharma, S.K., Nayyar, A., Paul, A., 2022. A Decade Review on Smart Cities: Paradigms, Challenges and Opportunities. IEEE Access 10, 68319–68364. https://doi.org/10.1109/ACCESS.2022.3184710

Srinivasan, R., 2014. The management consulting industry: Growth of consulting services in India. IIMB Management Review 26, 257–270. https://doi.org/10.1016/j.iimb.2014.09.001

Statista, 2022. Big Four accounting firms revenue 2022 [WWW Document]. Statista. URL https://www.statista.com/statistics/250479/big-four-accounting-firms-global-revenue/ (accessed 6.30.23).

Tulumello, S., Iapaolo, F., 2022. Policing the future, disrupting urban policy today. Predictive policing, smart city, and urban policy in Memphis (TN). Urban Geography 43, 448–469. https://doi.org/10.1080/02723638.2021.1887634

Turner, A.N., 1982. Consulting is more than giving advice. Harvard Business Review 60, 120–129.

Vanolo, A., 2014. Smartmentality: The Smart City as Disciplinary Strategy. Urban Studies 51, 883–898. https://doi.org/10.1177/0042098013494427

Verhoef, P.C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Qi Dong, J., Fabian, N., Haenlein, M., 2021. Digital transformation: A multidisciplinary reflection and research agenda. Journal of Business Research 122, 889–901. https://doi.org/10.1016/j.jbusres.2019.09.022

Vial, G., 2019. Understanding digital transformation: A review and a research agenda. The Journal of Strategic Information Systems, SI: Review issue 28, 118–144. https://doi.org/10.1016/j.jsis.2019.01.003

Werr, A., Styhre, A., 2002. Management Consultants - Friend or Foe? Understanding the Ambiguous Client-Consultant Relationship. International Studies of Management & Organization 32, 43–66. https://doi.org/10.1080/00208825.2002.11043670

Ylönen, M., Kuusela, H., 2019. Consultocracy and its discontents: A critical typology and a call for a research agenda. Governance 32, 241–258. https://doi.org/10.1111/gove.12369

Yoo, Y., Henfridsson, O., Lyytinen, K., 2010. Research Commentary—The New Organizing Logic of Digital Innovation: An Agenda for Information Systems Research. Information Systems Research 21, 724–735. https://doi.org/10.1287/isre.1100.0322

Belonging as a Relevant Success Factor for E-Government?

R. Preiß[1], D. Zetti[2] and C. Herzog[1]

[1]Institute of Electrical Engineering in Medicine, University of Lübeck, Germany

[2] Department of Science, Technology and Society, Technical University of Munich, Germany

Abstract. This contribution addresses citizen's expectations towards e-government. Based on an interview study, we argue that meeting expectations in e-government can contribute to a sense of belonging. Repeated references to types of mutual reliability articulate this belonging. Our findings are based on guided interviews with German citizens who have experienced administrative interaction in the past 12 months. The interview data indicate that the requirements for digital and analogue administrative procedures differ. In digital spaces, the aspects of transparency, efficiency, and safety are more pronounced. In contrast, analogue administrative procedures are often characterised by the interviewees as helping with weighing decisions for individual cases and the opportunity to ask unstructured questions.

The interviews further indicate that trust, obligations, and reciprocity play decisive roles in the socio-technical negotiation processes between citizens and the administration. Citizens must communicate case-specific data correctly and completely, while authorities are obliged to handle processes properly and responsibly. This exchange gives rise to mutual dependencies, which, in turn, lead to implicit expectations of the other party. The respective counterparts should reciprocate in terms of the swiftness by which data can be entered or processed digitally. For citizens, an accelerated way of submitting digital forms appears to imply accelerated administrative procedures. Our research suggests that, in addition to perceived added value, flexible online and offline administrative procedures and transparent processes, e.g., in terms of processes and contacts within the administration, as well as the specifics of data sharing, can be decisive success factors for e-government.

1 Introduction

E-government in Germany is often described as backward and clearly in need of improvement. When comparing the state of digitalisation in e-government with other nations, Germany tends to occupy the midfield (European Commission 2022; Van der Linden et al. 2022). A digitalised administration is considered progressive and the epitome of efficiency (Dodel & Aguirre 2018; Irani et al. 2007; Ndou 2004). It opens up new possibilities, e.g., in terms of process management, contact with citizens, and creates new opportunities for citizen participation, but it also poses various challenges. There is a risk that certain groups of citizens may feel excluded, for example due to a lack of skills to use the new digital platforms (Mesa 2023:9). A study from 2021 portrays 49 % of German citizens to possess at least basic digital skills, while 51 % scored lower in the corresponding test (European Commission 2022:24). In addition, only 7% of the population[31] does not have access to the Internet or is unable to use it. However, this percentage is decreasing (Initiative D21 2023:23).

Moreover, "an ambition to digitalize as much and as quickly as possible results in a one-size-fits all approach that actually fits only a few audiences, leaving many further disconnected from government" (Bertrand & McQueen 2021:31). Therefore, based on a qualitative interview study with citizens, we address the following question: can and does public administration facilitate a sense of belonging? If so, what are the key factors, how can they be shaped, and what forms do they take in e-government? Fundamental responsibilities, competencies and social potentials are also related and discussed based on the interview data.

The Corona pandemic in recent times has clearly shown how important interpersonal relationships are and that health burdens, such as depression and anxiety, can be caused by a lack of social contact (Courtin & Knapp 2017:808; Van Tilburg et al. 2021:249,253). To compensate for and maintain interpersonal contact, tools such as video conferencing, messenger services and other digital applications were increasingly used for information exchange and community-building (Sheldon et al. 2021:8). These digital tools are changing interpersonal interaction relationships on a broad scale. Communication technologies bridge the gap between physical and emotional aspects. They do not necessarily substitute one for the other but connect them to each other (Bier & Amoo-Adare 2016:21).Therefore, the question arises to what extent a digital public administration is responsible for creating new links to citizens, to expand these links and still promote traditional contact channels in analogue ways.

---

[31] Participants aged 14 and over were surveyed in this study.

Socialisation is increasingly occurring on and through digital applications, e.g., through social media, virtual reality or other communication and interaction platforms. This raises the question of how the socio-technical links between the analogue and the digital can find a place in e-government, or even be replaced altogether.

In the following, the current state of research on success factors of e-government and its effects on individuals is briefly presented and related to theoretical work on aspects of belonging. Then, the methodological approach is presented, and the results of our qualitative study are discussed in the context of the state of research and the theoretical construct. The paper concludes with a summary of the main findings, a discussion of the implications and an outlook on future research perspectives.

2 E-Government Particularities

To make tangible the possible societal impacts of advancing digitalisation in the context of e-government, we first present a definition of e-government due to Spirakis et al. (2010).

> Electronic government is the use of Information and Communication Technology in the transformation of government; primarily aiming to the improvement of accessibility, effectiveness and responsibility. It is based on the diffusion of the information and the information policy development. Electronic government guides to increasing citizens' participation and active citizens' development affecting the mechanisms of democracy. (Spirakis et al. 2010:75)

Increased efficiency, transparency and security are among the most important incentives that drive claims that government services should become exclusively digital (Belanche et al. 2010:110). Transparency about administrative processes and the status of processing tasks, data flows between different authorities and departments, information about the use of personal data, the purposes of this use and who has access to this information are other factors that can increase efficiency and accountability but also promote trust in public authorities (Van der Linden et al. 2022:24). Since most government services involve a legally binding obligation, trust is necessary to ensure operability and, thus, the appropriate use of administration. If trust is fundamentally lacking, incorrect data entry and denial of use are more likely to occur (Wirtz 2022:416).

Not only negative personal experiences, but also digital experiences are easily generalised to similar systems. Hardré already noted that trust in digital systems is assigned as a "generic whole", i.e., it often does not matter who specifically, e.g., provides a website and what other technological features are at work in the background (2016:91). Rather, websites are taken as representative artefacts as such, and an overarching trust extends onto other, but related websites. Tolbert and Mossberger are

more specific, finding "[...] that users of local government websites are more likely to trust local governments" (2006:355). However, an increase in general trust in government is more likely to be caused by other factors, such as age, gender, and political orientation (Tolbert & Mossberger 2006:366).

The European Commission ranks German e-government in 21st place, while Malta, Estonia and Luxembourg hold the top positions (Van der Linden et al. 2022:16). E-government progress is actively promoted by the German state, with the main objectives being international competitiveness and economic efficiency (BMWi 2021:11). Since Germany is often described as lagging behind in e-government because of gaps in transparent processes, due to its data management and the general frequency by which e-government services are used (European Commission 2022; Van der Linden et al. 2022:92), the question arises as to which factors are crucial to understanding e-government use and non-use from the citizen's perspective.

There is still insufficient research on decisive factors for a citizen-oriented implementation of e-government applications (Pleger et al. 2020:9; Scheiber et al. 2020:31). A clear deficiency in public administration, for example, as Funke describes, is that "citizens are generally not regarded as customers but as deserving (or undeserving) applicants" (Funke 2022:163). A shift in public administration culture towards greater service orientation would significantly enhance the success of e-government initiatives (Funke 2022:147,190). Other success factors are, for example, convenience, i.e., being able to contact authorities from home around the clock, that the systems are reliable and that they are easy to use and navigate. These predominantly refer to satisfactory experiences (Funke 2022:190; Scheiber et al. 2020:26,31). However, Scheiber et al. found that personal contact with public authority staff is a significant barrier to the use of digital services, with around 50 % of citizens in Germany and Switzerland preferring personal contact (2020:33). Therefore, the question arises why personal contact is important.

3 Human Needs and Belongingness

As citizens and administrations are in a mutually dependent relationship, the administration carries the responsibility to act in the interest of the citizens. This also includes enabling the fulfilment of basic human needs, e.g., via welfare allowances. With Maslow (1970) we can speak of interdependent basic needs that need to be met before needs such as safety, peace, security, and protection become relevant (1970:25; 72). Among "Maslow´s needs"—that can be seen as more than just basic but still highly relevant—are "feelings of belongingness, of being one of a group" (1970:72). In modern

welfare states, public administration has to be concerned with the whole range of needs so impressively described by Maslow and later visualised, for example, by Mcleod (2022) in the famous pyramid of needs.

According to Baumeister and Leary, the sense of belonging is an almost universal, innate need, which implies "a need to form and maintain at least a minimum quantity of interpersonal relationships" (Baumeister & Leary 1995:499). Accordingly, Baumeister and Leary also found that higher needs, such as the pursuit of "power" and "approval", are largely driven by the desire for belonging (1995:498).

Maslow identified the individual desire for more belonging within American society as early as the 1970s:

> […] by the need to overcome the widespread feelings of alienation, aloneness, strangeness, and loneliness, which have been worsened by our mobility, by the breakdown of traditional groupings, the scattering of families, the generation gap, the steady urbanization and disappearance of village face-to-faceness, and the resulting shallowness of American friendship[32]. (Maslow 1970:44)

Granovetter can be seen as another classic author of sociological theory that can help to understand, how public administration is more than a mere functional apparatus of the state. Citizens address institutions as a vis-à-vis, yet in another way than they approach relatives or friends. They establish so-called weak ties (Granovetter 1973). In this context, the strength of an "interpersonal tie" is a "combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services" (Granovetter 1973:1361). Accordingly, weak ties are those between acquaintances and other less intensive acquaintances, and strong ties are those between good "friends" and close family members (Granovetter 1973:1368). Since e-government includes an exchange of services and information through fleeting interaction relationships, we can assume a connection that corresponds to weak ties.

Belonging narratives are often shaped by past experiences (Heyd 2016:290). Feeling that thoughts and opinions are respected can also contribute to a sense of belonging to a particular community (Lohrenz et al. 2021:135). Furthermore, a sense of belonging can arise from observing community practices and even from hearing the positive experiences of others with which one can identify oneself (Bier & Amoo-Adare 2016:7; Nitschke & Schweiger 2021:363). However, negative experiences or the feeling of one's own lack of these observed practices can also lead to feeling rather lonely and excluded, for example. Another central feature through which people make their belonging to a certain community tangible is the common language (Anchimbe 2016:514). As Bublatzky notes, communication is "crucial to maintaining a sense of belonging among family,

---

[32] Whether the superficial friendships described here also apply in other societies cannot be said with certainty.

friends, and one's home country" and is facilitated not only in person but also on digital channels such as "mobile messaging" (2022:236). Hence, it can be concluded that belonging in the broadest sense is constituted by verbal and nonverbal communication as experienced or experiential knowledge within and outside socio-technical arrangements.

Another factor that is closely linked to the sense of belonging is the necessary trust already mentioned in the previous section. The trust placed in "leaders" and state authorities is strongly dependent on the intermediaries who stand between the individual subjects and can, if necessary, mediate trustworthiness (Granovetter 1973:1374). Not only does trust in state authorities and their intermediaries play a fundamental role in determining the extent to which one feels a sense of belonging, but also trust in oneself and one's own abilities. According to Lohrenz et al., users of digital services should have the feeling that they can control a situation on the basis of personal experience and acquired skills and that they can assess the consequences of their inputs or decisions (2021:135). These skills can thus be seen as enabling factors for a digitally supported sense of belonging. In addition, a greater sense of belonging to public authorities brings a certain added value by increasing the sense of community and reducing frustration with politics (Vetter 2011:2). Thus, the increasing sense of belonging also has a stabilizing effect on the legitimacy of political structures (Dahl 1967; Nitschke & Schweiger 2021:364).

4 Methodological Approach

The qualitative research underlying this work's approach is based on the Grounded Theory Methodology (GTM) according to Strauss and Corbin (1996), which is a modified form of the original methodology of the American sociologists Barney G. Glaser and Anselm L. Strauss. What is special about GTM, despite the systematic, rule-based approach, is that it retains space for creative association and, hence, an inherent openness in the research process allowing the discovery of a theory from empirical data (Mey & Mruck 2011:11; Berg & Milmeister 2011:326).

To discover relevant areas for research for the empirical methods, we conducted shorter participatory observations following (Breidenstein et al. 2015) with a total of five senior employees from the Federal Employment Agency, the Familienkasse Nord with the main task of processing and approving child benefit applications, Dataport as an IT service provider for public administration, the registry office and the citizens' service office. During these sessions, implementations of the respective administrative processes, as well as details regarding data flows are presented. Participant observations were

conducted under the principle of openness, meaning that the researchers identified themselves and introduced the associated project.

In order to gain concrete insights into the lifeworld of the citizens and to be able to analyze their views and experiences (Baur & Blasius 2019:15), guided interviews were conducted following Helfferich (2019). An initial open narrative prompt is intended to generate a multitude of relevant aspects for research to be deepened in a second step through appropriate queries (Helfferich 2019:676). The third step offers a scope for more structured and less open questions with predefined formulations (Helfferich 2019:677).

This three-step procedure is repeated per topic block. The thematic blocks are: experience horizon for life situation-specific administration interaction, wishes and expectations, administration-specific culture change and the handling of personal data and values in the digital space. This approach carries the advantage of exploring themes in close proximity to the narratives given by the interviewee. Hence, both structure and openness can be maintained as features of the approach.

We conducted interviews with ten citizens from Lübeck, a North German city with just under 220 000 inhabitants. Participants were chosen to differ as much as possible in their affinity for technology, social status, age and gender. The age range of the participants interviewed in the study spanned from 19 to 65 years. Out of the participants, 4 are female and 6 are male. The professional affiliations of the interview participants are as follows: 1 - geographer, 2 - social worker, 3 - teacher trainee, 4 - politician, 5 - psychology student, 6 - master carpenter, 7 - psychology student, 8 - retired person with an M. A. degree in communication science, 9 - retired laboratory manager in the field of biology, 10 - retired software developer. Interviewees should have had relevant administrative contact within one year prior to the start of the interview. The interview-specific data of this work includes two interviews on the topic of birth, six interviews on moving, and two interviews on unemployment.[33]

Central to the data analysis within GTM are recurring comparisons, extensive investigations into the data and theoretical coding (Corbin & Strauss 2015:88; Strauss et al. 2011:74). Collection and evaluation are continuing scientific processes. The following relates the theses from coding to the data from the participant observations and discusses them with further literature.

---

[33] To the best of their abilities, the authors took care to translate direct quotes including colloquialism from the interviews as literally as possible to convey intersubjective comprehensibility.

5 Findings
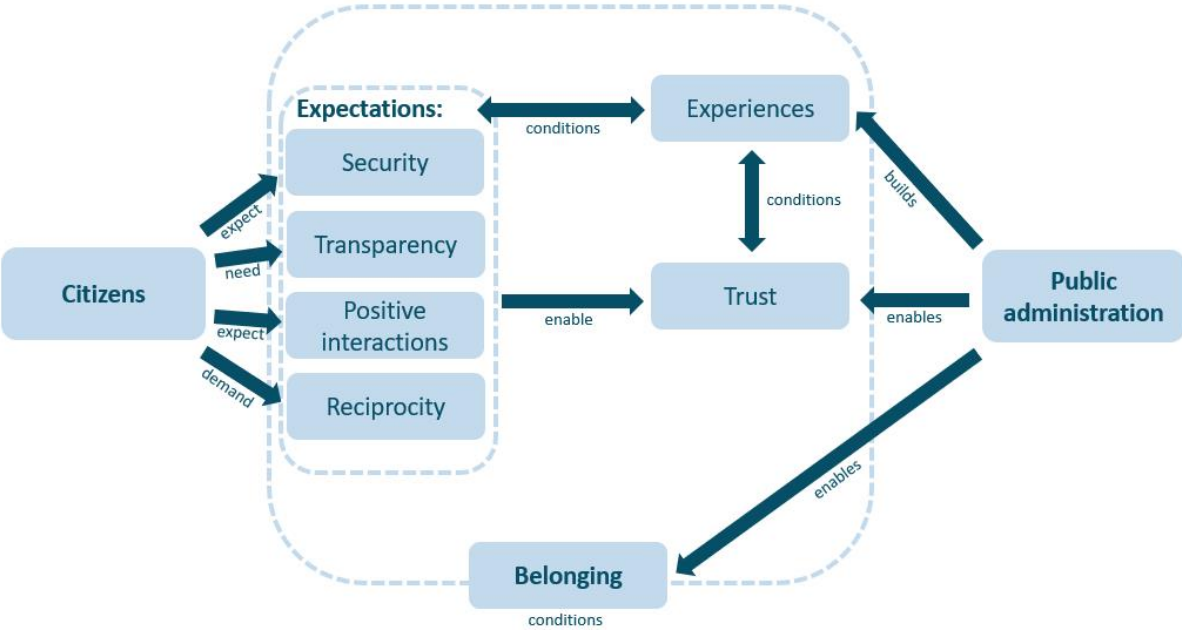
Figure 1: Category scheme (source: own illustration).

In this section we present results from the analysis of the interview data. For this purpose, we will elucidate aspects relevant to belonging, their connections and role in e-government implementations. To do this, we will analyse the experiences and expectations of the citizens from the interviews, relate them to the results of the participant observation and show similarities and differences to the current state of research from section 2 and 3. To illustrate the following argumentation and the categories found, see **Fig. 1**. In order to understand the figure, it should be noted that the terms can be understood differently depending on individual perceptions of the interviewees. For this reason, different perspectives on the terms are presented below and linked to the theoretical framework on the basis of the interview statements. On the left side of the figure, it shows that citizens have varying expectations of the public administration, which are linked to their experiences, trust in the system, and digital competencies. On the right, the public administration is seen as both a facilitator and a provider of experiences, trust, and a feeling of belonging. We will examine later how a sense of belonging affects different aspects and plays an important role in this matter. It should be noted that the themes are not exhaustive, but rather highlight the fundamental aspects that are closely related to the sense of belonging.

5.1 E-government Expectations and Success Factors

In order to make the connections from **Fig. 1** tangible, the citizens' expectations from the interview study are first presented and interpreted with reference to the theory. Administrators see the avoidance of personal contact with the public administration as an added value. This was expressed in the participant observation at the registry office and at the Familienkasse Nord. The desire to avoid personal interaction with representatives of the public administration personally was moreover indicated by several citizens in interviews (Int 3; 5; 8).

Digital communication channels, such as online forms or e-mail, make it possible to complete official tasks flexibly in terms of time and place, thus creating more freedom for private activities (Int 2; 3; 5; 8; 9). Another advantage is that external characteristics cease to have an influence on how citizens are treated, which was described as the most important advantage of e-government by one interviewee (Int 8). In the digital domain, stigmatizing looks, e.g., cannot induce biases. Hence, there is a perception of being treated more fairly and "only" on the basis of data, without inducing further judgmental attitudes. Therefore, the administration is more often expected to operate only as a task-fulfilling instance, which should receive and process the citizens' requests and otherwise, if possible, take up only a few points of interaction with the citizens (Int 3; 7). Especially for technology-savvy citizens, the digital way is the "fastest", "easiest" and "most uncomplicated" (Int 1; 2; 3; 5; 6). Contrary to the observation of Scheiber et al. 2020, the avoidance of personal contact is also partly expressed as a fundamental expectation of public administration in the context of an e-government implementation. This expectation is justified, for example, by the fact that commercial providers enable a purely digital service and that a different approach is no longer in keeping with the times (Int 3).

Data security is expected to be an important criterion for e-government, as stated in all interviews (Int 1-10). It is important to distinguish between data required for the fulfilment of official tasks, which were considered rather unproblematic to share, and more personal data such as "sexual preferences", "hobbies", "social gender" as well as "religious affiliation and body measurements" (Int 1; 4; 8). In the case of such data, which is not necessary for the official task, a clear limit is set as to what should not be shared, which is also evident in discussions on the danger of the "transparent citizen", see for example Wewer (2012). The desire for more anonymity also becomes evident from the following quote: "Because, of course, I don't want a situation like the one in China. That practically the state authorities know everything about me and that I am basically completely transparent" (Int 10). As our fifth interviewee pointedly describes, data protection in public administration should be "as open as necessary, as safe as possible" (Int 5).

Furthermore, it is expected, as already stated by Funke (2022), that the public administration exhibits more customer orientation in digital as well as analogue dealings with the citizens, and thus requires a friendly interaction, during which the needs can be addressed individually (Int 2; 4; 8). However, what is understood as customer orientation varies, but as an expectation it offers starting points for a possible sense of belonging, which is discussed in more detail in section 5.3.

The advantage of traditional visits to the authorities is, e.g., the direct exchange of relevant information and the possibility to ask unstructured questions (Int 2; 4; 9; 10). With a fully digital public administration, visits to the authorities are only necessary for specific concerns and in the event of problems (Int 9). In this context, it should be mentioned that especially non-tech-savvy groups of people face other difficulties and prefer personal contact partly due to a lack of access to technology, such as smartphones and computers, but also a lack of digital skills. Especially older people need support more often and are increasingly excluded in purely digital procedures (Int 8; 9). Therefore, for inclusive e-government, traditional exchange and contact must also be maintained.

During the participant observation at the registry office, it was stated that the citizens expect to receive birth certificates of newborns within one or two days, which was described as the "Amazon mentality"—a notion that is reflected in the fact that the registry office receives more calls when things do not go as quickly as hoped. There appears to be a lack of awareness that administrative processes that are seemingly simple from a citizens' perspective still involve complex analogue procedures in the administrative backend, some of them taking up to four weeks. In contrast to this is the view

> […] that because, since they [the clerks] exert a kind of pressure on the families, because you have to have all the documents within a week after birth. They, too, should turn this into some work zeal. So that you also get your documents quickly. [...] I would like to see that as reciprocity. (Int 2)

Here, administration is perceived as a single entity and it is also clear what the reasons for the desired processing time are. The assumption that big tech companies are responsible for the change in thinking (Morison 2019:38) and acting does not hold in this case and is rather based on a lack of citizens' insight into administrative processes. However, there are indications that an expectation of mutual reciprocity in the time allowed for input and output is amplified by the anonymity of digital interfaces. Interfaces influence expectations of digital administrative procedures. Reciprocity is shaped here by mutual dependency relationships that imply mutual obligation without direct compensation. The successful exchange of reciprocal services can promote fairness and solidarity on a broad level (Offe 2002:275). Furthermore, there are indicators that even in analogue procedures the public administration should enable reciprocity, for example, if one arrives "five minutes too late", the appointment is not cancelled immediately, but "[...] it's only fair if the person sitting behind the desk also has to wait a few minutes. It's

so very unbalanced" (Int 3). This shows not only the expectations that suggest mutual understanding, but also the balancing aspect that can make the exchange fair. Similar effects have already been described for the exchange of gifts by Marcel Mauss (1968), which describes a different form of reciprocity, but follows similar rules and thus conditions the expectation. During a mutual exchange of gifts, the time between the instant at which A presented a gift to B and the instant at which B reciprocates with another gift for A is called the "latency phase". In this "phase of uncertainty", A waits for something in return, which intensifies the relationship on both sides. B has already received the good, in this case the data from citizens (A), and is reminded of the giving person through his or her task of reciprocating the contribution (Stegbauer 2002:51). This relationship is particularly intensified by "more frequent enquiries by e-mail or telephone", which was the theme of the participant observation at the registry office. The phenomenon of the latency phase also became clear in the interviews: "you shoot your questions a bit into an orbit where you don't really know where they will arrive" (Int 1). If the service is then reciprocated, for example with the birth registration of the child, an "institutional bond" is created, which creates stability in social systems (Stegbauer 2002:42).

5.2 Transparency and Trust

In the following, we will use the interview data to show which forms transparency and trust take and how they are connected, as shown in **Fig. 1**. In this regard, as indicated in the previous section and in section 2, in order to meet citizens' expectations of e-government, there is a need to make processes, data transfer conditions and other unclear factors transparent. Only in this way can an understanding emerge as to why something happens the way it does and what one must pay attention to, as well as what one's own externally defined obligations are. In addition to transparent processes, a certain level of trust in technical solutions and in the instances behind them is essential for the sovereign use of e-government-related applications.

In order to increase "public trust" in e-government, Castelnovo (2013:3) proposes increased transparency, citizen participation formats and more decision-making opportunities for citizens. A need for more transparency is also evident in the interviews. Expectations of direct feedback on the processing status of submitted requests, an estimate of the time of completion, suitable contact persons and the respective areas of responsibility were mentioned (Int 1-10). Furthermore, the need for transparent and easy-to-understand guidelines, e.g., for birth registration came up: "That it is already clear to me on the internet what I have to submit" (Int 2).

Especially in administration, the issue of "trust" in and by citizens plays a major role, particularly due to mutual dependencies (Akkaya et al. 2011:89f.). Even though citizens have the legal obligation to enter their data correctly and completely in the respective registration process, a certain basic trust in state authorities must be given, which ensures that, e.g., deliberate misstatements in sensitive, yet comparably benign data inputs, do not occur and that the administrative processes may function smoothly. The interviews indicated that this basic trust is present:

> but there are certainly other institutions that I would trust less to handle my data carefully, than authorities that actually have my personal data anyway, about when I was born somewhere or registered. (Int 1)

However, skepticism can also be inferred from the interviewees' uses of the word "hope": "well, with the city I would hope that they have clarified this well with each other. That they don't pass it [personal data] on" (Int 2). There was support for making the provision of some data mandatory: "what I had to provide was ok, name, date of birth, gender. This didn't give me any headache" (Int 2). However, this raises the question of whether the sharing of sensitive data per se is met with approval due to a certain basic trust in state authorities or whether the normative framework as a legal obligation and the lack of an option to object leads to consent. For example, it was mentioned that the interviewee sees the disclosure of the child's gender as problematic, as it can restrict later choices of social gender. In fact, the interviewee would offer to share all mandatory information, while preferring uncomplicated ways of changing it later as pragmatic (Int 1). It is thus indicated that there is no blind trust, but a basic trust already exists in the "usual" procedures. Furthermore, one interviewee's knowledge of fireproof filing cabinets in the registry office contributed to the fact that he had no security concerns about the data and thus trusted the institution. Therefore, it can be seen that citizens' expectations and especially transparency enables a certain degree of trust (**Fig. 1**).

5.3 Belonging through E-government?

Since belonging is a very rich concept, individually expressed and differently perceived, this section will show where similarities with the theoretical construct can be found and what particularities can be identified in public administrations. Moreover, this section shows why belonging conditions citizens' expectations, trust and experiences, as shown in **Fig. 1.**

Since, as Maslow (1970) describes, basic human needs build on each other, are mutually dependent and cannot be seen as distinct, the question arises as to which needs can be met by public administration. Public administration can be seen as a kind of interface or mediator that enables the provision of basic needs such as money for food, shelter and protection against existential risks. In today's world, in addition to safeguards for mental

and bodily integrity, the protection of personal data seems to be an increasingly important aspect, see e.g. Cope et al. (2018). In this context, the interview results regarding the protection of personal data, as stated in the previous section, indicate that it is fundamentally assumed that the data to be shared is secure and only passed on to the necessary authorities. Therefore, from the perspective of the interviewees, it can be assumed that this need for security is being met. The expectation of the basic human need for security by public authorities can be enriched by the following quotation:

> […] without delay, without pressure, without fear, without hindrance, in any way. Friendly contacts, feeling as if I am in the state's good hands. That is what I want, a kind of affectionate contact. (Int 4)

In this quote, a need for state provided protection and thus a need to feel safe is evident. This appears to be translated into the desire for interactions with well-meaning and friendly administrative personnel. A similar requirement is also evident in the ninth interview when the interviewee states to expect "friendly", "patient" and "supportive" staff who "listen" and act in a solution-oriented way, i.e., a certain "service orientation" (Int 9). This coincides with the need for more customer orientation described in sections 2 and 5.1, which was also partly experienced according to the interviewees and can thus condition a certain sense of belonging.

But do citizens really desire personal interaction? One interviewee stated: "I always find public servants very kind. However, I don't have to see them too often", but only for processes that require "support" (Int 7) and other problems that can neither be solved online nor alone (Int 4; 9; 10). On the one hand, e-government is expected to minimise personal contact; on the other hand, there are also contrary opinions that advocate as much personal contact as possible and some interviewees view it critically "when it replaces positive social interactions" (Int 5). For older people, too, it is often seen as a hurdle, should it no longer be possible to see the authorities in person, or to be available to them by telephone at least (Int 2; 3; 4; 9; 10). In this context, the notion also came up that personal interaction with administrative staff is used to compensate for a lack of social contact by "people who really enjoy the fact that they can sit in front of a real person and actually describe their needs in personal contact" (Int 4). However, according to this interviewee, "it is not the task of the administration to completely meet all human needs", but nevertheless to provide assistance and information about potential contact points, for example to counteract trends towards increasing loneliness (Int 4). These statements support the findings of Scheiber et al. (2020), that the lack of personal contact can represent a significant barrier to e-government use. However, as already mentioned in 5.1, the interview data shows that personal contact can also be perceived as obstructive and annoying, especially for people with an affinity for technology, so there are indications that personal contact as well as purely online processing should be made available as needed (Int 2; 3; 6). The question of whether satisfactory online processing

can, on the basis of positive experiences with e-government, lead to a greater sense of belonging at a larger level, e.g., to the state, the political system or one's own society, cannot be answered conclusively here, e.g. because the state of implementation in Germany is not yet sufficiently advanced. What is clear, however, is that for those who only choose the digital process, where no personal exchange processes might be necessary, possible personal ties with administrative personnel are lost. These ties could have represented a personal added value as well as trust-building aspects due to personal exchange. In order to promote trust in a fully digitalised e-government, other ways and mechanisms are needed, as explained in the previous section.

On the other hand, if digital opportunities are used to establish communication and, for example, to make appointments for face-to-face contact and thus act as a bridge, they can also have a positive impact on the emergence of a sense of belonging and other trust-building aspects. A sense of belonging can also be created by the flexible digital interaction possibilities on other levels, as citizens then have more time in private for socialization aspects and can go to the authorities online at any time of the day (Int 2).

As Heyd (2016) and Lohrenz et al. (2021) add, belonging is determined by the experiences made and heard, and the feeling that thoughts and opinions are respected. The feeling of not being taken seriously makes it difficult to feel belonging, as one of the interviewees described with regard to the treatment her husband received:

> and quite often we experience it with authorities, not only the immigration office. My husband is the client who is charged, and they talk to me. […] And that does something to his self-confidence and to his ego. And I also find it extremely unprofessional. (Int 2)

This shows that such conduct is not in line with the perceived customer orientation. Moreover and most importantly, it gives evidence that her husband does not feel to be taken seriously because he is not accepted as a qualified interlocutor due to his comparable lack of German language skills, which calls into question his self-perception as a citizen (Int 2). Whether he would have had different experiences if he had appeared alone cannot be said here, also because his wife was obliged to come along according to her own statements. Nevertheless, there are indications that even the possibility of a sense of belonging to emerge is made more difficult, and that there is a greater need to break down communication barriers. E-government could perhaps even enhance this through multilingual chatbots or translation tools, which civil servants alone could not do. Therefore, in personal exchange, it is not only the client's responsibility, but also the administrative staff's responsibility to act in a context-sensitive way. Negative experiences not only make it more difficult to build trust, but also hinder a sense of belonging. For example, the eighth interviewee describes that he experienced "very rough handling" and was not taken seriously because of his slightly unkempt appearance, which is why he describes having experienced "no welcoming culture" and has the

impression that "there really is a selection with citizens who are wanted here [...] and those who are not" (Int 8). Due to these experiences of discrimination, he would clearly prefer e-government without personal contact, as he then has the feeling of being treated without prejudice. With regard to the administrative staff, the lack of personal contact is also described as an advantage, as they no longer have to see "unpleasant people" (Int 8). The 'empty corridors' and significantly lower visitor numbers experienced during the Corona period were also described during the participant observation as a positive and helpful change. In addition to the reciprocity described in section 5.1, these views indicate a further reciprocal expectation, which, according to Granovetter (1973), shows the strength of the tie and thus, as a link, provides indicators for an existing or lacking sense of belonging. The absence of personal contact does not create weak ties, which can have a negative impact on the sense of belonging. Exchange of information for reciprocal processes must occur on both sides and in similar time sequences. If this is not possible, at least transparent descriptions are needed so that expectations can be adjusted to a realistic process. If expectations can be sufficiently met through transparency, satisfactory security aspects and generally positive interactions, it is possible that trust in state authorities, based on previous experience and other aspects of socialisation, will emerge as an enabling factor for a sense of belonging. Therefore, a public administration which can build context-specific experiences, can be seen as an enabler of trust and belonging. See **Fig. 1** for an illustration.

6 Summary and Outlook

As Maslow describes, a sense of belonging is a basic human need. However, the satisfaction of basic physiological and safety needs to take precedence. Public administration contributes to the basic satisfaction of these needs. Building on these basic needs, it provides a sense of belonging, not only to the state but also to the social environment. Public administration can be seen as a kind of gatekeeper for more than just the satisfaction of basic human needs. For example, to enable personal and positive contact, to perceive the state as an institution that is available in case of problems and also offers personal support, and even to enable less socially involved citizens to feel a certain sense of belonging, if only by providing suitable contact persons.

Expectations of e-government are relevant to extending the qualities of basic security needs. These include the transparent, secure, reliable and trustworthy handling of personal data. It therefore can be concluded that e-government contributes to the conditions of belonging. Whether the sense of belonging is a decisive success factor for e-government depends on various factors and varies within subjective perceptions. In

terms of a sense of personal, perhaps even intimate interaction, e-government can be designed to give citizens a sense of belonging. However, this would require opportunities for exchange that allow personal interactions when needed and that create positive experiences.

The analysis of our interviews indicated that some citizens prefer to have as little face-to-face interaction with government as possible: (a) since they prefer to spend their time on activities that are more important to them. Online services therefore free up time for other types of social interaction. Thus, e-government can also indirectly facilitate aspects of belonging by, simply put, leaving citizens alone. Some citizens prefer to have rare interactions (b) because replacing face-to-face interactions can help to avoid unpleasant experiences. Language barriers, prejudices, etc. can turn face-to-face interaction into negative experiences, such as situations in which one does feel "unseen" or perceives to be not recognised as an autonomous subject. E-government offers solutions to both of these expectations. It should be noted that this perspective is very limited, as data-based and algorithmic processes tend to reinforce prejudices rather than reduce them (Gianfrancesco et al. 2018). Therefore, it would be more desirable to focus on more customer-oriented staff training in order to be able to guarantee personal links where necessary and to enable more positive experiences. It is, of course, a serious matter that citizens feel so disempowered to protest against biased administrations that they look to e-government to solve the problem.

However, it is possible that e-government can create additional weak ties that connect the lifeworld of, for example, a non-German-speaking immigrant with the administrative and political reality and thus create a certain sense of belonging through digital means. Whether it is simply the ability to easily find the right contact person or to provide direct support through technical solutions. Eliminating these interactions through purely digital administrative action removes the opportunity for weak bonds to be formed in the context of interactions with authorities, which could have a negative impact on the sense of being part of a community. This raises the question of whether such indirect connections facilitated by e-government are a good way of overcoming the problem of potentially fallible administrative staff. A counter-argument might well be that this is an attempt to use technology to solve social problems, when other attempts should be made to get administrators to be more empathetic, less judgmental and more reasonable in meeting citizens' expectations.

References

Akkaya, Cigdem; Obermeier, Manuela; Wolf, Petra; Krcmar, Helmut (2011): Components of Trust Influencing eGovernment Adoption in Germany. In: Marijn Janssen, Hans J. Scholl, Maria A. Wimmer, Yao-hua Tan (ed.), Electronic Government. Berlin, Heidelberg: Springer, pp. 88–99. DOI: 10.1007/978-3-642-22878-0_8.

Anchimbe, Eric A. (2016): Digital Narratives of Belonging as Anglophone or Francophone in a Cameroon Online News Forum. In: Open Linguistics 2(1), pp. 511–527. DOI: 10.1515/opli-2016-0027.

Baumeister, Roy; Leary, Mark (1995): The Need to Belong: Desire for Interpersonal Attachments as a Fundamental Human Motivation. In: Psychological bulletin 117(3), pp. 497–529. DOI: 10.1037/0033-2909.117.3.497.

Baur, Nina; Blasius, Jörg (ed.) (2019): Handbuch Methoden der empirischen Sozialforschung. Wiesbaden: Springer. DOI: 10.1007/978-3-658-21308-4.

Belanche, Daniel; Casaló, Luis V.; Flavián, Carlos (2010): The Importance of Confirming Citizens' Expectations in e-Government. In: W. Cellary, E. Estevez (ed.), I3E 2010, IFIP AICT 341, pp. 103–111.

Berg, Charles; Milmeister, Marianne (2011): Im Dialog mit den Daten das eigene Erzählen der Geschichte finden: Über die Kodierverfahren der Grounded-Theory-Methodologie. In: Grounded theory reader. Wiesbaden: VS Verlag für Sozialwissenschaften. pp. 303–332.

Bertrand, Arnauld; McQueen, Julie (2021): How can digital government connect citizens without leaving the disconnected behind? In: EY | Building a better working world. Electronic Document. https://www.ey.com/en_gl/government-public-sector/how-can-digital-government-connect-citizens-without-leaving-the-disconnected-behind [18.05.2023].

Bier, Mareike; Amoo-Adare, Epifania A. (2016): Not Quite Home or Alone: A Conversation on Belonging in a Digital Age. In: Crossroads Asia Working Paper Series 31.

BMWi (2021): Digitalisierung in Deutschland – Lehren aus der Corona-Krise. Electronic Document.
https://www.bmwk.de/Redaktion/DE/Publikationen/Ministerium/Veroeffentlichung-Wissenschaftlicher-Beirat/gutachten-digitalisierung-in-deutschland.pdf?__blob=publicationFile [10.02.2023].

Breidenstein, Georg; Hirschauer, Stefan; Kalthoff, Herbert; Nieswand, Boris (2015): Ethnografie: Die Praxis der Feldforschung. Konstanz: UTB GmbH.

Bublatzky, Cathrine (2022): Mobile Belonging in Digital Exile: Methodological Reflection on Doing Ethnography on (Social) Media Practices. In: Media and Communication 10(3). DOI: 10.17645/mac.v10i3.5379.

Castelnovo, Walter (2013): A stakeholder based approach to Public Value. In: Proceedings of the 11th European Conference on eGovernment: ECEG Como, Italy, pp. 94–101.

Cope, Kevin L.; Crabtree, Charles; Lupu, Yonatan (2018): Beyond Physical Integrity. In: Law and Contemporary Problems 81(4), pp. 185–195.

Corbin, Juliet M.; Strauss, Anselm L. (2015): Basics of qualitative research: techniques and procedures for developing grounded theory, Fourth edition. Los Angeles, London, New Delhi, Singapore, Washington DC, Boston: SAGE.

Courtin, Emilie; Knapp, Martin (2017): Social isolation, loneliness and health in old age: a scoping review. In: Health & Social Care in the Community 25(3), pp. 799–812. DOI: 10.1111/hsc.12311.

Dahl, Robert Alan (1992): The Problem of Civic Competence. In: Journal of Democracy 3(4), pp. 45–59. DOI: 10.1353/jod.1992.0048.

Dodel, Matias; Aguirre, Florencia (2018): Digital inequalities' impact on progressive stages of e-government development. In: Proceedings of the 11th International Conference on Theory and Practice of Electronic Governance, New York, NY, USA: Association for Computing Machinery (ICEGOV '18), pp. 459–463. DOI: 10.1145/3209415.3209475.

European Commission (2022): The Digital Economy and Society Index (DESI), Shaping Europe's digital future. Electronic Document. https://digital-strategy.ec.europa.eu/en/policies/desi [06.06.2023].

Funke, Corinna (2022): DIGITIZATION, FAST AND SLOW: Comparing the creation of digital public services in Denmark, France and Germany, Florence: European University Institute.

Gianfrancesco, Milena A.; Tamang, Suzanne; Yazdany, Jinoos; Schmajuk, Gabriela (2018): Potential Biases in Machine Learning Algorithms Using Electronic Health Record Data. In: JAMA Internal Medicine 178(11), pp. 1544–1547. DOI: 10.1001/jamainternmed.2018.3763.

Granovetter, Mark S. (1973): The Strength of Weak Ties. In: American Journal of Sociology 78(6), pp. 1360–1380.

Hardré, Patricia L. (2016): When, How, and Why Do We Trust Technology Too Much? In: Sharon Y. Tettegah und Dorothy L. Espelage (ed.), Emotions, Technology, and Behaviors. San Diego: Academic Press, pp. 85–106. DOI: 10.1016/B978-0-12-801873-6.00005-4.

Helfferich, Cornelia (2019): Leitfaden und Experteninterviews. In: Handbuch Methoden der empirischen Sozialforschung., 2nd ed. Wiesbaden: Springer, pp. 669–686.

Heyd, Theresa (2016): Narratives of Belonging in the Digital Diaspora: Corpus Approaches to a Cultural Concept. In: Open Linguistics 2(1). DOI: 10.1515/opli-2016-0013.

Initiative D21 (2023): D21-Digital-Index 2022/2023 – Jährliches Lagebild zur Digitalen Gesellschaft. Electronic Document. https://initiatived21.de/uploads/03_Studien-Publikationen/D21-Digital-Index/2022-23/d21digitalindex_2022-2023.pdf [11.09.2023].

Irani, Zahir; Love, Peter E. D.; Montazemi, Ali (2007): e-Government: past, present and future. In: European Journal of Information Systems 16 (2), pp. 103–105. DOI: 10.1057/palgrave.ejis.3000678.

Lohrenz, Lisa; Michalke, Simon; Robra-Bissantz, Susanne; Lattemann, Christoph (2021): Mechanismen zur Gestaltung erfolgreicher digitaler Plattformen. In: Wirtschaftsinformatik & Management 13(2), pp. 132–142. DOI: 10.1365/s35764-021-00323-0.

Maslow, Abraham H. (1970): Motivation and personality, 2d ed. New York: Harper & Row.

Mauss, Marcel (1968): Die Gabe: Form und Funktion des Austauschs in archaischen Gesellschaften. Frankfurt am Main: Suhrkamp.

Mcleod, Saul (2022): Maslow's Hierarchy of Needs. Electronic Document. https://www.simplypsychology.org/maslow.html [02.05.2023].

Mesa, Diego (2023): Digital divide, e-government and trust in public service: The key role of education. In: Frontiers in Sociology 8:1140416. DOI: 10.3389/fsoc.2023.1140416.

Mey, Günter; Mruck, Katja (2011): Grounded-Theory-Methodologie: Entwicklung, Stand, Perspektiven. In: Grounded theory reader, 2d ed. Wiesbaden: VS Verlag für Sozialwissenschaften, pp. 11–48.

Morison, Brittany (2019): Big Tech and the Right to Freedom of Thought. In: The iJournal: Student Journal of the University of Toronto's Faculty of Information 5(1), pp. 35–40. DOI: 10.33137/ijournal.v5i1.33472.

Ndou, Valentina D. (2004): E - Government for Developing Countries: Opportunities and Challenges. In: The Electronic Journal of Information Systems in Developing Countries 18(1), pp. 1–24. DOI: 10.1002/j.1681-4835.2004.tb00117.x.

Nitschke, Paula; Schweiger, Moritz (2021): Alltagspraktiken digitaler Teilhabe in Nachbarschaft und Stadt. In: Medien & Kommunikationswissenschaft 69(3), pp. 363–379. DOI: 10.5771/1615-634X-2021-3-363.

Offe, Claus (2002): Reproduktionsbedingungen des Sozialvermögens. In: Bürgerschaftliches Engagement und Zivilgesellschaft. Wiesbaden: VS Verlag für Sozialwissenschaften. DOI: 10.1007/978-3-322-93263-1_19.

Scheiber, Patricia; Müller, Lena-Sophie; Stein, Fabian; Krcmar, Helmut; Hein, Andreas; Daßler, Lukas; Paul, Linda; Exel, Stefanie; Pleger, Sarah (2020): eGovernment Monitor 2020: Staatliche Digitalangebote – Nutzung und Akzeptanz in Deutschland, Österreich und der Schweiz. Electronic Document. https://initiatived21.de/app/uploads/2020/10/egovernment_monitor_2020_onlineausgabe.pdf [03.07.2021].

Sheldon, Pavica; Antony, Mary Grace; Charoensap-Kelly, Piyawan; Morgan, Sarah; Weldon, Laina (2021): Media and interpersonal channels uses and preferences during the COVID-19 pandemic: the case of the United States, Thailand, and Croatia. In: Heliyon 7, pp. e07555. DOI: 10.1016/j.heliyon.2021.e07555.

Spirakis, Grigorios; Spiraki, Christina; Nikolopoulos, Konstantinos (2010): The impact of electronic government on democracy: E-democracy through e-participation. In: Electronic Government, An International Journal 7(1), pp. 75–88. DOI: 10.1504/EG.2010.029892.

Stegbauer, Christian (2002): Reziprozität. Einführung in soziale Formen der Gegenseitigkeit. Wiesbaden: Westdeutscher Verlag.

Strauss, Anselm; Corbin, Juliet (1996): Grounded Theory: Grundlagen qualitativer Sozialforschung. Weinheim: Beltz.

Strauss, Anselm L.; Legewie, Heiner; Schervier-Legewie, Barbara (2011): Forschung ist harte Arbeit, es ist immer ein Stück Leiden damit verbunden. Deshalb muss es auf der anderen Seite Spaß machen. In: Günter Mey und Katja Mruck (ed.), Grounded Theory Reader, 2nd ed. Wiesbaden: VS Verlag, pp. 69–78.

Tolbert, Caroline J.; Mossberger, Karen (2006): The Effects of E-Government on Trust and Confidence in Government. In: Public Administration Review 66(3), pp. 354–369. DOI: 10.1111/j.1540-6210.2006.00594.x.

Van der Linden, Niels; Sem Enzerink; Jochem Dogger; Horst, Myrte ter; Eijk, Teddy van (2022): eGovernment Benchmark 2022: synchronising digital governments : background report., LU: Publications Office. Electronic Document. https://data.europa.eu/doi/10.2759/204448 [27.04.2023].

Van Tilburg, Theo G.; Steinmetz, Stephanie; Stolte, Elske; Roest, Henriëtte Van Der; De Vries, Daniel H.; Deborah Carr (ed.) (2021): Loneliness and Mental Health During the COVID-19 Pandemic: A Study Among Dutch Older Adults. In: The Journals of Gerontology 76(7), pp. e249–e255. DOI: 10.1093/geronb/gbaa111.

Vetter, Angelika (2011): Lokale Politik als Rettungsanker der Demokratie? In: bpb.de, (Politik und Zeitgeschichte), Nr. 2011. Electronic Document. https://www.bpb.de/shop/zeitschriften/apuz/33489/lokale-politik-als-rettungsanker-der-demokratie/ [13.04.2023].

Wewer, Göttrik (2012): Auf dem Weg zum gläsernen Staat? Privatsphäre und Geheimnis im digitalen Zeitalter. In: dms – der moderne staat – Zeitschrift für Public Policy, Recht und Management 5(2), pp. 247–262. DOI: 10.3224/dms.v5i2.01.

Wirtz, Bernd W. (2022): Nachfrageorientiertes/Nutzerorientiertes E-Government. In: E-Government. Berlin, Heidelberg: Springer. DOI: 10.1007/978-3-662-65330-2_10.

Knowing in Algorithmic Regimes: Insights from a Roundtable Discussion on Methods, Interactions and Politics

Bianca Prietl[1], Stefanie Büchner[2], Simon Egbert[3], Juliane Jarke[4], Katharina Kinder-Kurlanda[5], Nikolaus Poechhacker[6]

[1] Gender Studies, Department of Social Sciences, University of Basel, Switzerland

[2] Institute of Sociology, University of Hannover, Germany

[3] Faculty of Sociology, University of Bielefeld, Germany

[4] BANDAS-Center & Department of Sociology, University of Graz, Austria

[5,6] Digital Age Research Center, University of Klagenfurt, Austria

Abstract. This paper reports on a roundtable discussion that reflected upon the analytically productive moments of working with the concept of "algorithmic regimes" when studying the methodological, epistemological and political implications of the rise of algorithms in and for knowledge production, sense making and decision-making in contemporary societies. Focusing on knowledge and knowing, the concept of "algorithmic regimes" draws our attention beyond the mere technical nature of algorithms by acknowledging the complex and partly ambiguous entanglements of algorithmic systems as material-semiotic apparatuses with social, political, cultural and economic elements of society. Examples from our own research demonstrate the versatility of the concept of "algorithmic regimes" for studying (1) the *methods* to research and design (better) algorithmic systems, (2) the ways *interactions* become re-configured within algorithmic regimes and (3) the *politics* ingrained in algorithmic regimes. Analysing algorithmic regimes can then provide understanding for shaping desirable sociotechnical futures.

1 Algorithmic Regimes: Object of and Tool for Analysis

The starting point of our thinking about "algorithmic regimes" are the manifold observations that algorithms have risen to become one, if not *the* central technology for producing, circulating and evaluating knowledge in multiple societal arenas – in academia as well as in everyday-life, in the public as well as in the private sector: algorithmic decision-making systems are employed to assist in deciding upon who is

eligible for social welfare, they are developed to solve complex logistic problems or establish new research paradigms based on so-called data science methods (see e.g. Gillespie 2014; Beer 2018; Kitchin 2022; Jarke et al. *forthcoming*). Just as the related applications are highly heterogeneous, so are the assessments of these sociotechnical developments: on the one hand, 'knowing in algorithmic regimes' allows for new modes of participatory and collaborative knowledge-making and knowledge circulation (Milan 2013; Rajão & Jarke 2018; D'Ignazio & Klein 2020), on the other hand, knowledge production within algorithmic regimes has proven to be "violent" (McQuillan 2022) or "harmful" (Noble 2018; Eubanks 2018), with scholars and activists pointing to algorithmic discrimination (Gebru 2019; Prietl 2019; Chun 2021) or threats of surveillance and control (Lyon 2015; Zuboff 2019; Véliz 2021; Brayne 2021).

Against this background, it seems not only timely, but essential to study the implications that the observed turn to algorithms has, and will continue to have, for the epistemological, methodological and political foundations of knowledge production, sense making and decision-making in contemporary societies. In order to attend to this shift in society's "regime[s] of truth" (Foucault 1976/1980; Deleuze 1992), characterized by an "epistemic colonization" (Gillespie 2014) of computationally driven techniques and modes of knowledge production, it is necessary, however, to look beyond the mere technical nature of algorithms. We need to acknowledge and attend to the wider social, political, cultural, economic and material entanglements of algorithmic systems as they apply to the generation, accumulation, storage, connection and analysis of (big) data in the vein of producing, evaluating and circulating knowledge (e.g. Seaver 2019).

We argue that the concept of "algorithmic regimes" (Jarke et al. *forthcoming*) offers a productive analytical tool for doing so. The term *regime* thereby allows to conceptualize said transformation as "more or less stable socio-material assemblages which surface as coherent patterns of thinking and acting in the world" (Jarke et al. *forthcoming*; see also Foucault 1977, 1976/1980; Deleuze & Guattari 1987: 503). The qualifying term *algorithmic* further acknowledges that "the techniques and procedures which are valorised for obtaining truth" (Foucault 1976/1980: 93) today, are transformed due to the widespread deployment of algorithms and algorithmic systems. It allows to highlight the new quality accompanying the broad implementation of algorithmic systems across society, while at the same time keeping in mind that this current development has a history of its own, building, amongst others, upon longstanding efforts to govern the world with the help of techniques of measurement, quantification and standardization (e.g. Porter 1986). Put together, the concept of "algorithmic regimes" then draws our attention to the material-semiotic "apparatuses" (Barad 2007), cultures and practices that configure and regulate how (valid) knowledge is produced and by which means truth claims can be made in our society.

As our comprised work demonstrates, the concept of "algorithmic regimes" proves productive to study and understand (1) the *methods* necessary and adapt to research and design (better) algorithmic systems, (2) the ways *interactions* become re-configured within algorithmic regimes, and (3) the *politics* and power relations ingrained in algorithmic regimes. Throughout the remainder of this paper, we highlight some of the aspects of algorithmic regimes that stood out in our respective research, showcasing the versatility of "algorithmic regimes" as an analytical tool (section 2). Being convinced that algorithms are here to stay, we will end with some 'speculations' (Puig de la Bellacase 2017) about how the study of algorithmic regimes might open up pathways to desirable sociotechnical futures (section 3).

2 The Versatility of Algorithmic Regimes: Highlighting Methods, Interactions and Politics

In the course of our joint roundtable discussion we reflected upon the analytically productive moments of working with the concept of "algorithmic regimes". The following depiction highlights some of the aspects of algorithmic regimes that this analytical tool helped us shed light on in our respective research.

2.1 Algorithmic Regimes and their Monsters

Juliane Jarke – drawing on her chapter with Hendrik Heuer – explored the trope of the black box as a *method* to study algorithmic regimes (see Jarke & Heuer *forthcoming*). The starting point of their argument is the observation that in many cases algorithmic systems are experienced as encountering and having to deal with black boxes (e.g. Pasquale 2015; Innerarity 2021; Noble & Roberts 2017; Heuer et al. 2021). Referring to black boxes in these instances covers two aspects: (1) an understanding of algorithmic systems as devices that produce and record data for further use, similar to data-monitoring systems in planes, trains or cars; and (2) an understanding of algorithmic systems that are – to some extent – unknown or "unknowable" (Seaver 2017: 5) and can only be grasped in relation to their inputs and outputs. One example is the current discourse around algorithmic transparency and algorithmic accountability which views algorithmic systems as black boxes that need to be "opened" and "unpacked" and as something whose inner workings ought to be made visible to outside observers and auditors (e.g. Bucher 2018; Pasquale 2015). For "opening" or "unpacking" these algorithmic black boxes, it is important to distinguish between algorithmic systems based on imperative programming and algorithmic systems that are based on machine learning (ML). In the second case, the code of ML-based systems cannot be studied as

instructional text in which the intentions of the programming subjects are inscribed, but requires a different approach (see also Heuer et al. 2021).

Jarke and Heuer (*forthcoming*) attend to this challenge and propose to understand algorithmic black boxes not as "a *thing* that we can encounter out there in the field" (Straube 2019: 178; original emphasis), but as a mode of *inquiry* and boundary making *knowledge practice*. They explore what exactly critical algorithm studies scholars aim to unpack when they examine the black box of machine learning (ML), what they consider to be within the boundaries of this black box and what is "othered" – or appears "monstrous" (Bloomfield & Vurdubakis 1999; Law 1991). To do so, Jarke and Heuer review three distinct modes: (1) the black box of ML data, (2) the black box of ML algorithms and trained models and (3) the black box of ML-based systems in practice. In reconstructing these three ML black boxes, Jarke and Heuer demonstrate different ways of accounting, relating, connecting and folding spaces, times and (social) actors through algorithmic systems. In sum, approaching black boxing as a method rather than a thing, allows to reconstruct different ways in which our social and technical realities come to be enfolded into algorithmic regimes.

2.2 Breaks and Frictions of Algorithmic Regimes

Stefanie Büchner – referring to a chapter co-authored with Henrik Dosdall and Ioanna Constantiou – highlighted the necessity to consider "organizations as active context" when studying algorithmic regimes (see Büchner et al. *forthcoming*). Using the case of predictive policing in Germany, they argue that organizations are more than just implementation sites or facilitators for algorithmic regimes. This "more", as they propose, can be explored with a lens of organizational sociology that analyses organizations as complex social systems (Büchner 2018; Luhmann 2018: Büchner & Dosdall 2021). In the case of predictive policing in Germany, the authors show that organizations like the police do not only enable but also restrict and relativise how algorithmic regimes unfold. Focussing on three organizational dimensions – goals, differentiation and goal conflicts – organizations come into view as active elements of algorithmic regimes.

In the German case of predictive policing, the impact of the algorithmic system deployed to prevent burglaries is limited because prevention turns out to be only a subordinate goal of police organizations. Instead, fighting crime and immediately reacting to incoming calls and emergencies are leading formal goals of the organziation and also have a higher reputation within the police culture. Also goals in organizations are not harmonistic elements that structure procedures without friction. When it comes to the algorithmic prevention of burglaries, a severe goal conflict weakens the algorithmic regime: The need for manual data work of the police force increased while, at the same time, the broad range of tasks was not reduced. As organizational datafication is often accompanied with

such non-automatable data production and holds organizational members accountable to do data work (Jarke et al. 2022), this goal conflict is very likely to intensify across organizational types in the future.

Paying attention to these shades of influence allows for a more nuanced understanding of the *organizational layer* of algorithmic regimes. This complex layer or active context that organizations form, consists not only of general characteristics but also of those typical for some but not all organizational types (Dosdall 2023; Dosdall & Löckmann 2023). This perspective encourages analysis to pay more attention to the relational analysis of organizational constellations to better understand what typical organizational constellations foster influential or less influential algorithmic regimes.

Paying attention to effects that are not only catalysing, but also causing frictions and breaks within algorithmic regimes can help to prevent over- as well as underestimating the ways that algorithmic regimes re-configure *interactions.* Studying the complex role of organizations as elements with own complexities within algorithmic regimes, then, complements approaches of keeping 'humans in the loop' (Danaher 2016).

2.3 The Logics behind Algorithms

Nikolaus Poechhacker – drawing on his chapter with Marcus Burkhardt and Jan-Hendrik Passoth – called upon us to look at the "principle of algorithmic systems" to analyze the *logics behind* algorithms in order to understand their impact (see Poechhacker et al. *forthcoming*). The contribution highlights how different algorithmic techniques (Rieder 2017) specifically require and order interactions within the wider algorithmic regime. This ordering power rests on the inscribed interaction assumptions in algorithmic approaches, and which actors and items are being related toward each other via an algorithmic logic. To showcase this, Poechhacker, Burkhardt and Passoth discuss the implications of two different algorithmic techniques within recommender systems: content-based filtering and collaborative filtering, and how they produce what has been called "calculated publics" (Gillespie 2014). This also raises immediately the more abstract yet important societal dimension of these ordering efforts: How can we understand algorithmic regimes as being part of a democratic public discourse?

Search engines and increasingly recommender systems have been identified as a problem for democratic societies as they supposedly fragment public discourse into what has been called "filter bubbles" (Pariser 2012). While information filtering is a necessary function within the ever-growing information ecosystem of our increasingly digital societies, it may also lead to political echo-chambers (Sunstein 2009), where democratic exchange between different political positions comes to a halt – and results in polarization. Or in other words: The algorithmic regime with recommender systems as a

central element orders interaction in a way that constructs a fragmented and potentially polarized public sphere – creating multiple, parallel and hardly or not intersecting publics instead of a common interaction and communication space.

While this is undoubtedly an issue for democratic systems[34], the insight that public discourse exists of multiple publics is not new. Dewey (2006/1927) already argued in the early 20th century that publics emerge in the plural. In his view, however, this was not a problem but a pragmatist possibility for bottom-up democracy. The question was – and is – then, how the emergence of different publics is accompanied and mediated. This raises especially questions for societies that rely increasingly on digital technology and digital media (see e.g. Marres 2007, 2017). Applying these insights to algorithms then raises the question of what the algorithmic logic is that mediates the formation of publics and how we can manage them in a democratic discourse. Having a closer look at two different techniques of recommender algorithms can illustrate this point. In their contribution Poechhacker, Burkhardt and Passoth discuss two ideal-typical approaches to recommendations: content-based filtering and collaborative filtering (Aggarwal, 2016). In both approaches the similarity of items is being calculated via a mathematical function. However, how they do so differs. Content-based filtering utilizes the available meta-data and/or descriptive data for the items. Thus, the algorithm mediates between the practices of (meta)data producers, within broadcasters mostly editors, and the consumption practices of the user. Collaborative filtering on the other hand tries to identify similar consumption patterns between users. Thus, the mode of comparison targets different users and relates their practices with each other. The latter approach does not rely on any form of meta-data, yet requires an extensive tracking data-set of the users to be able to compare them with each other. Both approaches of recommendations follow their very own approach to produce similarity of items – and thus recommendations – and how they assume and order the interactions within he broader algorithmic regime. The chain of relations connects users, producers, tracking software, meta-data databases, etc. – depending on which approach one would follow. Based on what technique is being utilized, different actors are becoming relevant and their interactions are being ordered based on the algorithms specific logic – which then results in different modi of the production of publics. How publics emerge and how we can shape them into a public sphere is thus also determined by the algorithmic techniques we deploy.

The goal of this short description is not to argue that algorithms and their regimes are all-powerful structures or actors that need to be abolished. Quite to the contrary, the contribution argues that identifying the logics behind algorithms and how the algorithmic

---

[34] This is of varying degrees true for "classical" theories of public discourse and democracy where Habermas is the most prominent scholar, but also for other political philosophies that are following the approach of radical democracy. For a detailed discussion see Helberger (2019) or Poechhacker (*forthcoming*).

system within organizes interactions, becomes an important vantage point for future interventions. For example, knowing that content-based filtering relates practices of editors and users via the production of meta-data, allows us to think about other moments of change than this would be the case in collaborative filtering. To build systems differently and to intervene in a wider algorithmic regime, it is important to understand how algorithmic systems mediate *interactions* – not only but especially regarding questions of democracy.

2.4 Power-Knowledge Nexus

Simon Egbert – by drawing on his theoretical conceptualization of predictive regimes as part of algorithmic regimes – drew our attention to the power-knowledge nexus and the limits of knowing in algorithmic regimes as well as the pre-structured nature of algorithmically generated knowledge (see Egbert *forthcoming*). In doing so, he especially highlighted two facets of 'knowing in algorithmic regimes': first, the general tendency of predictive analytics to focus on behavioral data and, second, their conservative tendency.

Like many other types and forms of algorithmic analysis, predictive algorithms use primarily data sets that mainly comprise behavioural data and do not contain any information on the underlying interests and motives of the persons concerned. In the case of recommender systems in online shopping, for example, this means that one can only read out from the existing data *that* a person has bought a certain product together with another item, but not *why* they have done so. Following Krasmann (2020), this implies a "logic of the surface", underlining that algorithms do not understand the things they are analysing in an hermeneutical way. Rather, "the world of algorithms (…) is flat" (Krasmann 2020: 2102), reducing human behaviour to a purely behavioural level: If I do this, then they do that. This is why Rouvroy (2013: 143), while analysing predictive algorithms, speaks of "data behavioralism" as a "new way of knowledge production about future preferences [*sic*] attitudes, behaviours, or events without considering the subject's psychological motivations, speeches, or narratives, but rather relying on data." This implies that predictive algorithms are only able to process certain kinds of data and, hence, that they are able to see the world only in a specially distored way, rendering opaque many of the things that make the world complex and heterogeneous.

Second, Egbert highlighted the fact that predictive algorithms tend to have a conservative tendency, since they neceassarily rely on data from the past, extrapolating this data into the future by assuming that the future will be like or similar to the past (e.g. Kaufmann et al. 2019: 685–686). This "conservative or reactionary nature" of predictive analytics is indeed signifying its "intrinsic weakness", because it makes it incapable "to apprehend the new, the abnormal or the spontaneous" (Lazaro & Rizzi 2023: 83), thus being inherently ad odds with social change (Prietl 2019).

Before this backdrop and following literature from governmentality studies (e.g. Dean 1999; Miller & Rose 2008), Egbert proposed to understand predictive algorithms as "rendering devices" in order to enable a focussed analysis of the field of vision these tools, as knowledge production tools, are equipped with. And these fields of vision are always and inevitably also fields of the invisible, since making something visible also means that other things are left in the dark (Bröckling et al. 2011). This selection in many cases lies in the conscious and unconscious decisions of people, which is why algorithms are ultimately always *political*, which again marks the close reference to power and knowledge, already highlighted in Foucault's (1976/1980) account of governmentality.

2.5 Possibilities and Politics of Algorithmic Regimes from the Inside

Katharina Kinder-Kurlanda – referring to her chapter co-authored with Miriam Fahimi – highlights the "various possibilities and problems of intervening in algorithmic regimes from the inside" and how we need to understand the politics involved in efforts to change algorithmic systems for the better.

In their chapter, Kinder-Kurlanda and Fahimi (*forthcoming*) look at those who are trying to improve on some of the well-documented issues of bias and discrimination that arise with algorithms. Specifically, they use a computer science-led project as a case study to investigate in more detail efforts of fixing the problems that many see with algorithmic regimes: an interdisciplinary EU project on developing bias-aware algorithms. The project addresses fairness issues mostly – but not only – at a technical level. Its setup is interdisciplinary and the project also offers spaces for both legal scholars and social scientists to participate in the projects' efforts to intervene in algorithmic regimes. This intervention results in a collective attempt to achieve better understanding of algorithmic bias and fairness issues and, out of this understanding, to develop solutions to mitigate bias issues for possible use by industrial partners involved in the project. The project is thus trying to change the algorithmic regime 'from the inside'.

In their chapter, Kinder-Kurlanda and Fahimi reflect on the interdisciplinary process of negotiating terms, concepts and decisions between the involved project participants, who were all part of different epistemic communities. These communities were also changing, with the topic of fair AI both becoming a focus of new, emerging communities and also effecting change upon methods and approaches in existing disciplines. The project as an interdisciplinary effort within this setting was in itself what the authors call 'a negotiated compromise' within the algorithmic regime. It imposed a certain vocabulary and defined what could be researched, how to recruit, what to disseminate and so on, building on existing and new ideas of how research was to be accomplished within the area of fair AI. In this, it turned out that project participants were often limited by the demands of discipline-specific expectations, methods and approaches of what successful academic

work meant within their specific career situation, e.g. as a PhD student in computer science or as a principal investigator in the social sciences. There were thus limits to what 'intervention' could be achieved for everyone within the project. For example, in interviews and observations of the interdisciplinary process, the authors found that the available methods for mitigating bias for the computer science PhD students could not necessarily satisfy their goal of achieving 'real fairness'. These students were thus finding ways to engage with wider perspectives on fairness and human rights, struggling to achieve strategic research goals while doing something 'meaningful'. The possibilities for intervention seemed limited and pre-structured for all involved in the project. At the same time, some ways of acting seemed easier than others and specific types of knowledge seemed to be easier to produce, e.g. cleaning a dataset in such a way that it did not contain gender bias. Such 'technical fixes' were seen to be very productive and promised success in publications, funding and gaining interest from industry.

The chapter therefore also highlights how those who are trying to 'fix' algorithms, also have a role in contributing to a new algorithmic regime – addressing bias may not suffice to make the algorithmic regime 'fair'. The new regime may again serve to allow some actors (and not others), to profit and to extend their control within specific settings – but it may also offer new and different ways for building fair algorithms and for intervening in unfair settings. Kinder-Kurlanda and Fahimi, thus, show how attempts to intervene in the algorithmic regime play out, by taking the intervention as a starting point to consider the *politics* of algorithms and the politics of *intervention*. Looking towards the present and the future, we may then ask how other attempts to intervene, especially regulation, facilitate very specific ways of addressing issues of bias and fairness and which ways of making algorithms fair become productive or successful, and what new inclusions or exclusion thus may be created.

3 Pathways to Desirable Sociotechnical Futures: Translating Algorithmic Regimes

Considering the manifold challenges, risks, and dangers accompanying the digital transformation of society, especially the "violent" and "harmful" effects of 'knowing in algorithmic regimes', the question arises of how studying algorithmic regimes can open up pathways to desirable sociotechnical futures. Committed to the idea that we need to think about how to (better) design, use and live with algorithmic systems, we think that current efforts to regulate said systems by ethics and/or legislation are too narrow as they strongly focus on individuals to be fixed – be it bad algorithms, biased data sets or incautious programmers and developers. This technosolutionist approach underpinning

current efforts to regulate algorithmic systems seems too limited and in the worst case may even stabilize the very algorithmic regimes set out to change 'for the better' (see also Prietl 2021). Instead we need more holistic interventions in algorithmic regimes that go beyond 'fixing' the algorithms.

Reaching beyond the algorithms first of all calls for us to attend to the whole algorithmic regime, the material-semiotic apparatuses, sociocultural norms and practices involved in bringing about algorithmic knowledge, and ask for where and how to intervene in order to bring about change. Put differently, it is not enough to focus on the technology, and how it may be fixed (again with technological means), but to consider the different elements of algorithmic regimes as potential points of departure for their reconfiguration. Such interventions in algorithmic regimes should be as democratic, inclusive, and participatory as possible. We therefore think that we can learn from the tradition of participatory design (see e.g. Costanza-Chock 2020; Mucha et al. 2022) for how to involve different social groups and communities in developing, and deploying algorithmic systems – and the pitfalls of such approaches, such as participation requirements that constitute uneven barriers to access for different groups of people. An essential prerequisite for establishing a broad societal exchange about the design, and use of algorithmic systems seems to be "data literacy" or more generally: the knowledge necessary to partake in such debates (see also Storms & Alvarado *forthcoming*). This is not necessarily technical knowledge and certainly not limited to technical expertise; instead what seems important is an understanding of the complex entanglements of the material-semiotic elements of algorithmic systems and their sociocultural, political, economic and environmental implications. In creating said understanding, (STS-)scholars can do important "translation work", to re-frame a term coined by Latour (1999). The concept of "algorithmic regimes" can contribute to such translation work by guiding research that allows for clarifying and making transparent the complex and ambiguous relationalities implied in 'knowing in algorithmic regimes'.

References

Aggarwal, Charu C. (2016). Recommender Systems: The Textbook. Springer.

Barad, Karen (2007): Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning. Duke University Press.

Beer, David (2018): The data gaze: Capitalism, power and perception. SAGE Publications.

Bloomfield, Brian P.; Vurdubakis, Theo (1999): The Outer Limits: Monsters, Actor Networks and the Writing of Displacement. In Organization, pp. 625–647. https://doi.org/10.1177/135050849964004.

Brayne, Sarah (2021): Predict and Surveil. Data, Discretion, and the Future of Policing. Oxford University Press.

Bröckling, Ulrich; Krasmann, Susanne; Lemke, Thomas (2011): From Foucault's Lectures at the Collège de France to Studies of Governmentality. In U. Bröckling, S. Krasmann, & T. Lemke (Eds.): Governmentality. Current Issues and Future Challenges. Routledge, pp. 1-33.

Bucher, Taina (2018): If...then: Algorithmic power and politics. Oxford University Press.

Büchner, Stefanie (2018): Zum Verhältnis von Digitalisierung und Organisation. In Zeitschrift für Soziologie, pp. 332–348. DOI: 10.1515/zfsoz-2018-0121.

Büchner, Stefanie; Dosdall, Henrik (2021): Organisation und Algorithmus. Wie algorithmische Kategorien, Vergleiche und Bewertungen durch Organisationen relevant gemacht werden. In Kölner Zeitschrift für Soziologie und Sozialpsychologie, pp. 333–357. DOI: https://doi.org/10.1007/s11577-021-00752-0.

Büchner, Stefanie; Hergesell, Jannis; Kallinikos, Jannis (2022): Digital Transformation(s): On the Entanglement of Long-Term Processes and Digital Social Change. An Introduction. In Historical Social Research, pp. 7–39. DOI: https://doi.org/10.12759/hsr.47.2022.25.

Büchner, Stefanie; Dosdall, Henrik; Constantiou, Ioanna (forthcoming): The Organization in the Loop: Exploring Organizations as Complex Elements of Algorithmic Assemblage. In J. Jarke, B. Prietl, S. Egbert, Y. Boeva, H. Heuer, M. Arnold (Eds.): Algorithmic Regimes: Methods, Interactions, Politics. Amsterdam University Press.

Chun, Wendy (2021): Discriminating Data. Correlation, Neighborhoods, and the New Politics of Recognition. MIT Press.

Costanza-Chock, Sasha (2020): Design justice: Community-led practices to build the worlds we need. The MIT Press.

Danaher, John (2016): The Threat of Algocracy. Reality, Resistance and Accommodation. In Philosophy & Technology, pp. 245–268. DOI: 10.1007/s13347-015-0211-1.

Dean, Mitchell (1999): Governmentality. Power and Rule in Modern Society. SAGE .

Deleuze, Gilles (1992): Postscript on the Societies of Control. October 59 (Winter), pp. 3–7.

Deleuze, Gilles; Guattari, Félix (1987): A thousand plateaus: Capitalism and schizophrenia. University of Minnesota Press.Dewey, John (2006/1927): The Public & Its Problems. Combined Academic Publ.

D'Ignazio, Catherine; Klein, Lauren F. (2020): Data Feminism. The MIT Press.

Dosdall, Henrik (2023): Die Organisation Polizei. In M. Apelt, V. Tacke (Eds.): Handbuch Organisationstypen. 2. Aufl. Wiesbaden, Springer, pp. 213–234. DOI: https://doi.org/10.1007/978-3-658-39559-9_10.

Dosdall, Henrik; Löckmann, Teresa (2023): Exploring Terrorism Prevention. An Organizational Perspective on Police Investigations. In Journal of Organizational Sociology.

Egbert, Simon (forthcoming): Algorithmic Futures: Governmentality and Prediction Regimes. In J. Jarke, B. Prietl, S. Egbert, Y. Boeva, H. Heuer, M. Arnold (Eds.): Algorithmic Regimes: Methods, Interactions, Politics. Amsterdam University Press.

Eubanks, Virgina (2018): Automating inequality: How high-tech tools profile, police, and punish the poor. St. Martin's Press.

Foucault, Michel (1977): The political function of the intellectual. In Radical Philosophy 17 (13), pp. 12–14.

Foucault, Michel (1976/1980): Two Lectures. In Foucault, Michel: Power/Knowledge. Selected Interviews and Other Writings 1972–1977. Pantheon, pp. 78–108.

Gebru, Timnit (2019): Race and Gender. In M. Dubber, F. Pasquale, S. Das (Eds.): The Oxford Handbook on AI Ethics. http://arxiv.org/abs/1908.06165.

Gillespie, Tarleton (2014): The Relevance of Algorithms. In T. Gillespie, P. J. Boczkowski, K. A. Foot (Eds.): Media technologies: Essays on communication, materiality, and society. The MIT Press, pp. 167–193.

Helberger, Natali (2019): On the Democratic Role of News Recommenders. Digital Journalism 7(8), pp. 993–1012. https://doi.org/10.1080/21670811.2019.1623700

Heuer, Hendrik; Jarke, Juliane, & Breiter, Andreas (2021): Machine Learning in Tutorials: Universal Applicability, Underinformed Application, and Other Misconceptions. In Big Data & Society, 8(1), 1–13. https://doi.org/10.1177/20539517211017593

Innerarity, Daniel (2021): Making the black box society transparent. In AI & SOCIETY, 36(3), pp. 975–981. https://doi.org/10.1007/s00146-020-01130-8

Jarke, Juliane; Zakharova, Irina; Breiter, Andreas (2022): Organisational Data Work and Its Horizons of Sense: On the Importance of Considering the Temporalities and Topologies of Data Movement When Researching Digital Transformation(s). In Historical Social Research / Historische Sozialforschung 47 (3), pp. 142–170. DOI: https://dx.doi.org/10.12759/hsr.47.2022.29.

Jarke, Juliane; Heuer, Hendrik (forthcoming): Reassembling the Black Box of Machine Learning: Of Monsters and the Reversibility of Foldings. In: In J. Jarke, B. Prietl, S. Egbert, Y. Boeva, H. Heuer, M. Arnold (Eds.): Algorithmic Regimes: Methods, Interactions, Politics. Amsterdam University Press.

Jarke, Juliane; Prietl, Bianca; Egbert, Simon; Boeva, Jana; Heuer, Hendrik; Arnold, Maike (Eds.) (forthcoming): Algorithmic Regimes. Methods, Interactions, Politics. Amsterdam University Press.

Kaufmann, Mareile; Egbert, Simon; Leese, Matthias (2019): 'Predictive Policing and the Politics of Patterns'. In The British Journal of Criminology 59 (3), pp. 674–692. https://doi.org/10.1093/bjc/azy060.

Kitchin, Rob (2022): The Data Revolution. A Critical Analysis of Big Data, Open Data & Infrastructure. 2nd edition. SAGE.

Kinder-Kurlanda, Katharina; Fahimi, Miriam (forthcoming): Making Algorithms Fair. Ethnographic Insights from Machine Learning Interventions. In J. Jarke, B. Prietl, S. Egbert, Y. Boeva, H. Heuer, M. Arnold (Eds.): Algorithmic Regimes: Methods, Interactions, Politics. Amsterdam University Press.

Krasmann, Susanne (2020): The logic of the surface. On the epistemology of algorithms in times of big data. In Information, Communication & Society, 23(14), pp. 2096–2109. https://doi.org/10.1080/1369118X.2020.1726986.

Latour, Bruno (1999): Circulating Reference. Sampling the Soil in the Amazon Forest. In B. Latour: Pandora's Hope. Essays on the Reality of Science Studies. Harvard University Press, pp. 24–79.

Law, John (Ed.) (1991): A sociology of monsters: Essays on power, technology and domination. Routledge.

Luhmann, Niklas (2018): Organization and decision. Cambridge University Press.

Lyon, David (2015): Surveillance after Snowden. Polity Press.

Marres, Nortje (2007): The Issues Deserve More Credit: Pragmatist Contributions to the Study of Public Involvement in Controversy. In Social Studies of Science, 37(5), pp. 759–780. https://doi.org/10.1177/0306312706077367

Marres, Nortje (2017): Digital Sociology: The Reinvention of Social Research. John Wiley & Sons.

McQuillan, Dan (2022): Resisting AI: An Anti-fascist Approach to Artificial Intelligence. Policy Press.

Milan, Stefania (2013): Social movements and their technologies: Wiring social change. Palgrave Macmillan.

Miller, Peter; Rose, Nikolas (2008): Governing the Present. Administering Economic, Social and Personal Life. Polity Press.

Mucha, H., Correia de Barros, A., Benjamin, J.J., Benzmüller, C., Bischof, A., Buchmüller, S., de Carvalho, A., Dhungel, A.-K., Draude, C., Fleck, M.-J., Jarke, J., Klein, S., Kortekaas, C., Kurze, A., Linke, D., Maas, F., Marsden, N., Melo, R., Michel, S., Müller-Birn, C., Pröbster, M., Rießenberger, K.A., Schäfer, M.T., Sörries, P., Stilke, J., Volkmann, T., Weibert, A., Weinhold, W., Wolf, S., Zorn, I., Heidt, M., Berger, A. (2022): Collaborative Speculations on Future Themes for Participatory Design in Germany. In i-com: Journal of Interactive Media , 21(2) , pp. 283-298.

Noble, Safiya U. (2018): Algorithms of Oppression: How Search Engines Reinforce Racism. NYU Press.

Noble, Safiya U.; Roberts, Sarah. T. (2017): Out of the Black Box. https://er.educause.edu/articles/2017/3/out-of-the-black-box

Pariser, Eli (2012): The filter bubble: How the new personalized Web is changing what we read and how we think. Penguin Books/Penguin Press.

Pasquale, Frank (2015): The Black Box Society: The Secret Algorithms That Control Money and Information. Harvard University Press. https://doi.org/10.4159/harvard.9780674736061

Poechhacker, Nikolaus (forthcoming): Democratic Algorithms. Meson Press.

Poechhacker, Nikolaus; Burkhardt, Markus; Passoth, Jan-Henrik (forthcoming): Recommender Systems Beyond the Filter Bubble: Algorithmic Media and the Fabrication of Publics. In J. Jarke, B. Prietl, S. Egbert, Y. Boeva, H. Heuer, M. Arnold (Eds.): Algorithmic Regimes: Methods, Interactions, Politics. Amsterdam University Press.

Porter, Theodore M. (1986): The Rise of Statistical Thinking 1820–1900. Princeton University Press.

Prietl, Bianca (2019) : Algorithmische Entscheidungssysteme revisited: Wie Maschinen gesellschaftliche Herrschaftsverhältnisse reproduzieren können. In feministische studien, pp. 303-319.

Prietl, Bianca (2021) : Warum Ethikstandards nicht alles sind. Zu den herrschaftskonservierenden Effekten aktueller Digitalisierungskritik. In Behemoth, pp. 19-30. DOI: https://doi.org/10.6094/behemoth.2021.14.2.1057.

Puig de la Bellacase, Maria (2017) : Matters of Care. Speculative Ethics in More Than Human Worlds. University of Minnesota Press.

Rajão, Raoni; Jarke, Juliane (2018): The materiality of data transparency and the (re)configuration of environmental activism in the Brazilian Amazon. In Social Movement Studies 17(3), pp. 318-332. DOI: 10.1080/14742837.2018.1459297.

Rieder, Bernhard (2017): Scrutinizing an algorithmic technique: The Bayes classifier as interested reading of reality. In Information, Communication & Society, 20(1), pp. 100–117. https://doi.org/10.1080/1369118X.2016.1181195

Rouvroy, Antoinette (2013): The end(s) of critique: data behaviourism versus due process. In M. Hildebrandt, K. de Vries (Eds.): Privacy, Due Process and the Computational Turn. The Philosophy of law meets the philosophy of technology. Routledge, pp. 143-167.

Seaver, Nick (2017): Algorithms as culture: Some tactics for the ethnography of algorithmic systems. In Big Data & Society, 4(2). https://doi.org/10.1177/2053951717738104

Seaver, Nick (2019): Knowing Algorithms. In J. Vertesi, D. Ribes (Eds.): DigitalSTS: A fieldguide for Science & Technology Studies. Princeton University Press, pp. 412–422.

Storms, Elias; Alvarado, Oscar (forthcoming): Sensitising for Algorithms Foregrounding Experience in the Interpretive Study of Algorithmic Regimes by Elias Storms & Oscar Alvarado. In J. Jarke, B. Prietl, S. Egbert, Y. Boeva, H. Heuer, M. Arnold (Eds.): Algorithmic Regimes: Methods, Interactions, Politics. Amsterdam University Press.

Straube, Till (2019): The black box and its dis/contents. In M. de Goede, E. Bosma, P. Pallister-Wilkins (Eds.): Secrecy and Methods in Security Research. Routledge, pp. 175-192. https://doi.org/10.4324/9780429398186-18

Sunstein, Cass R. (2009): Republic.com 2.0. Princeton University Press.Véliz, Carissa (2021): Privacy is power. Melville House.

Zuboff, Shoshana (2019): The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power. PublicAffairs.

Online Political Participation by Fridays For Future Graz

Sonja Radkohl[1]

[1]Institute of Journalism and Digital Media, University of Applied Sciences,
FH JOANNEUM, Graz, Austria

Abstract. Fridays For Future (FFF) is one of the most successful social movements when it comes to motivating young people worldwide to participate in protest actions. In this regard, they effectively reach their target groups through digital platforms, where they spread knowledge about climate change and connect with allies.

Behind the scenes, however, the organizational teams are small. The active members often have to take on many tasks simultaneously. To better distribute this workload, FFF faces the necessity to motivate further young people not only to demonstrate but also to engage in organizational tasks.

Against this background, I explore different possibilities to support the organizational teams of FFF based on a case study of FFF in Graz, Austria. I started my fieldwork with ethnographic observations and informal conversations at demonstrations and networking meetings. There, I came into close contact with the social media and communication teams of FFF in Graz.

We (the communication teams and I) developed the next steps of our joint research in two workshops. Using methods from the field of content strategy (mainly card sorting), we discussed which topics or challenges were most relevant to them. It has become apparent that, above all, researching their existing and reaching new target groups is an important issue.

As a result, we developed approaches for researching current and thinking strategically about future target groups. I will summarize the most important opportunities for action in research and further pathways in this paper.

1 Introduction

Young people, in particular, are in a unique situation, as they are confronted with the reality of a changing climate, and the consequences of this crisis will affect their own futures. Awareness of the climate catastrophe is generally on the rise in this age group, as evidenced by the recent pan-European Climate Change Survey. 64% of 15 to 24-

year-old participants claimed they had taken action on climate change – an increase of 7% from 2019 (European Commission, 2021). However, when looking at specific actions, it is apparent that these tend to be individual and easy-to-implement actions (such as recycling or avoiding plastic) rather than aimed at overall societal change. Activism is therefore still underrepresented.

With this in mind, this paper explores the communication and participation on digital media of those young people who are not only interested in issues related to climate catastrophe but also want to take active action against it. Since Greta Thunberg's first school strike in 2018, the Fridays For Future (FFF) social movement has galvanized millions of people around the globe to take action and protest for just climate policies to combat global warming. FFF is unparalleled in its scale and ability to motivate young people to participate (e.g., Wahlström et al. 2019; Wallis & Loy, 2021). According to FFF, 30,000 people participated in the last global climate strike in Austria in March 2023. FFF's main demand is to achieve the goal of the Paris Agreement, i.e., to keep the global temperature increase below 1.5 °C and to ensure climate justice. The activists consider their approach to be highly political, with impartiality being crucial (fridaysforfuture.org).

Together, we investigate the communication and especially the use of social media within FFF and with their target groups through a card sorting process focusing on the challenges FFF describe when interacting with their target groups on social media. In this process, the activists help to shape the focus, methods, data collection and evaluation according to their individual motivations. Together, we explore different possibilities for research and support for the organisational teams of FFF based on a case study of FFF in Graz, Austria.

2 Background – Activism and Political Participation on Social Media

The term "climate activist" originates from social and behavioural environmental research (SGuin et al., 2021; Hunecke et al., 2011) and is intended to describe the personal commitment of citizens who influence the environment and environmental policy through their involvement in environmental organizations or the private sector. Individual political actionism at the legal level means making one's voice heard and taking action. Collective activism means networking and participating in demonstrations, protests, and rallies (see Ekman and Amnå 2012).

To classify climate activism, O'Brien et al. (2018) developed a scheme of "dutiful, disruptive, and dangerous dissent." These are to be understood as gradations – from actionism within existing institutional spaces to initiating, developing, and realizing alternatives that challenge structures and systems and support long-term transformations.

All three levels are relevant to society as a whole and have their own strengths and weaknesses: "Dutiful dissent", for example, uses the possibilities within current structures and systems, but does not question them and never goes beyond them. "Dangerous dissent" presents holistic ideas that go beyond a concrete climate measure (such as "transition towns"), but rarely reaches the masses due to its radical nature. Since FFF criticise and want to break up the existing structures, but at the same time want to appeal to the broad masses and do not commit themselves to more radical forms of protest, the movement can be classified as disruptive (FFF Austria, Statement Letzte Generation; Neas et al., 2022).

When considering social media participation, I want to draw on the concept of digitally networked participation. It is defined as a "networked media-based personalized action that is carried out by individual citizens with the intent to display their own mobilization and activate their social networks in order to raise awareness about, or exert social and political pressures for the solution of a social or political problem" (Theocharis, 2015, p. 6). This quotation indicates that digitally networked participation is based on traditional forms of (political) participation, such as taking political action oneself and, in addition, encouraging others to participate. However, it goes beyond giving these forms new outlets. The term "digitally networked" describes technical possibilities that shape political participation and enable new modes of networking and behaviour, such as sharing information globally, forming groups online, using protest hashtags, etc. For this purpose, the concept of political participation has to be opened, allowing for new forms and taking into account not only very active expressions but also cognitive political participation such as finding information online (Waeterloos et al., 2021). Climate activism begins with low-threshold actions such as promoting cycling in one's own neighbourhood, which are relevant in their entirety and oftentimes can be even more impactful than more disruptive forms of activism (O'Brien et al., 2018).

What is very interesting here are the so-called spill-over effects from the online to the offline world and vice versa e.g., forming an online group after a demonstration, connecting online to then protest offline, etc. Not only can these forms coexist and inform each other, but can also be interconnected, for example when posting live from a strike (Vissers & Stolle, 2014). This digitally networked participation is especially interesting for research with young people: There is this notion that they are passive and have no interest in political issues, when in fact they are just using other channels and opportunities for participation (e.g. Crowley and Moxon, 2017).

3 Methods

I initiated this case study through ethnographic observation and informal conversations at demonstrations and networking meetings (Gobo and Molle 2017, Kozinets 2020). The aim was to learn about FFF's existing structures and networks and to identify research pathways relevant to both the activists and me as a researcher. As the focus of the project is on social media participation, FFF Graz proposed to work primarily with activists participating in their social media and communication working group (ASMCs). Further steps were based on content strategy.

The discipline of content strategy encompasses a broad spectrum of methods and tools for the user-centred development of web content. The focus is on ensuring that it meets the needs of users while supporting the goals of organizations or individuals who created the content (Halvorson & Rach, 2012). Mesibov (2019), for example, notes that user engagement with digital platforms has increased significantly through the use of content strategy methodologies. What makes content strategy so interesting for research with young people is that most of the methods are low-threshold, practical to use, and provide quick results. To this end, I conducted two workshops in which I adapted the innovative method of card sorting (Bergold & Thomas 2010; Best et al. 2021; Bloomstein 2012) to the needs of FFF.

The workshops took place in late 2021 and early 2022. The first workshop was held twice – once online and once offline – with a total of 6 participants, and the second was held online with 3 participants. 2 of them attended both workshops. At the time of the first workshop, they had been involved in the FFF movement for between 1 month and 2.5 years and were attending schools or universities in Graz. They were between 14 and 30 years old.

In the first workshop, I engaged participants to freely identify topics in participation and social media to specify issues that were relevant to FFF. Participants noted topics on cards, discussed them and ranked them by priority and feasibility. After this workshop, we agreed on the focus of researching the target groups of FFF (for details on how this focus was chosen see **Sec. 4.3**).

In the second workshop, we further concretized the topics and formed research questions to define where exactly we lack knowledge about the target groups. I asked participants to begin by openly formulating questions they had about their current audiences. Later, they grouped these questions into clusters. For this step, we used the categories developed by the Youth Participation Action Research Hub (https://yparhub.berkeley.edu/): demographic, knowledge, attitude, behaviour, and belief (see **Fig. 4**). In the end, we discussed opportunities for further actions in research and other areas. These

opportunities were suggested by me and the participants gave feedback on them, assessing whether they would achieve their communication goals and whether they were feasible in terms of their possibilities (see **Sec. 4.4**).

The whole process was audio recorded and transcribed with a smoothing out of the flow of speech. In addition, I used screenshots and photos of the card sorting process as data. I conducted a content structuring qualitative analysis, forming categories a priori and based on the material (Kuckartz, 2018). Direct quotes and figures have been translated into English by me.

4 Results

4.1 FFF in general

Although the FFF movement motivates thousands of people to protest, the core team is much smaller: about 20 to 30 people in Graz take care of organizing strikes and other actions, fundraising, design, mobilization, social media, etc. These areas of responsibility are organized into working groups with people usually working in several working groups. The working group concerned with communication and social media activities consists of two to five people.

Figure 1: The FFF movement is successful in motivating people to participate in demonstrations. This photo was taken during the September 2021 global climate strike in Graz, Austria.

In the subsequent sections, I provide an overview of the ASMCs' description of their communication activities and their assessments of FFF's content performance, and then focus on the challenges they face as these challenges lead to the second workshop and the card sorting activity.

4.2 Overview of Communication Activities

ASMCs use various channels and platforms for communication with their target audiences. In the latter case, Facebook and Instagram are particularly noteworthy. ASMCs' descriptions of their target groups, why they use these platforms and whom exactly they want to reach on these social media platforms remain vague: They use Facebook primarily for events and communication with (older) target groups, whereas Instagram is intended to reach all target groups, but is seen primarily as an important platform for students and young people. Very similar, if not the same, content is posted.

ASMCs are very clear about their communication goals. They want to shed light on the climate crisis and inspire more people to get involved in the movement. To achieve their goals, they use a content mix consisting of topics related to demonstrations as well as more substantive topics such as the carbon footprint, the most affected people and areas of the climate crisis, the eco-social tax reform, etc. In this context, it is important for the activists to communicate not only the crisis but also possible solutions. They want to show that, as a political movement, their primary goal is not to change individuals (and their climate-conscious behaviour), but the system. To do this, they are also joining forces with other social movements as allies under the motto "one struggle, one fight".

4.3 Content Performance and Challenges

ASMCs identified topics that are important to them and ranked them in order of priority and feasibility. I conducted this workshop twice (once offline and once online). Comparing the two, it is noteworthy that participants in the offline workshop focused more on topics they wanted to address more often in their communication activities but were struggling with, such as most affected people and areas. They described these topics as complex and therefore challenging to address in a single social media post. Participants in the online workshop focused more on organisational tasks and strategy, such as having a publishing plan and creating more content, for example for YouTube. (see **Fig. 2** and **Fig. 3**).

According to ASMCs, strike-related content, such as calls to action, showing "people in action" (P1), or slogans on the signs, tends to generate high levels of audience interaction. Formats such as appealing graphics, videos with "more effort" (P3) such as strike recaps with clips and photos, collages or live reports are also well received.

In contrast, ASMCs describe content-rich topics as receiving much less attention. They are conflicted about the reasons for this. They suspect that the platforms' algorithms, but also the fact that these topics have a more negative spin, are responsible for the moderate success: "Such a strike is basically positively afflicted, there are many people there, there is a good mood and then comes such an explanatory post (...) I think it really has to do with the fact that the content posts are usually not so positive" (P2).

In terms of participation in the movement, they are satisfied with how many people they reach from their "bubble" (P2) and with how many of them attend demonstrations. However, ASMCs are concerned about how to reach more people on the one hand: what formats to use, where to find them, and how to communicate with them. On the other hand, since the workload of individuals in the working groups is often very high, they urgently want more people to participate in the working groups and to get more involved than merely attending demonstrations. For example, ASMCs often struggle to create enough quality content for their platforms. In other words, spill-over effects from participating in demonstrations to helping with (online) content creation and other organisational tasks can only be observed in a very small and highly motivated group of young people.

ASMCs have tried to motivate others by offering open meetings that anyone can attend, but so far this approach has not been as successful as they would like it to be. Activists suspect that many people who are interested in the movement think that they have to live a perfectly climate-friendly life in order to participate in the FFF movement. However, they describe their approach as somewhat different, arguing that the current system does not allow, or makes it difficult, for people to live 100% climate-friendly. They also addressed this topic in postings. Also, as mentioned above, the FFF movement, in general, does not primarily aim to change individual people, but the system.
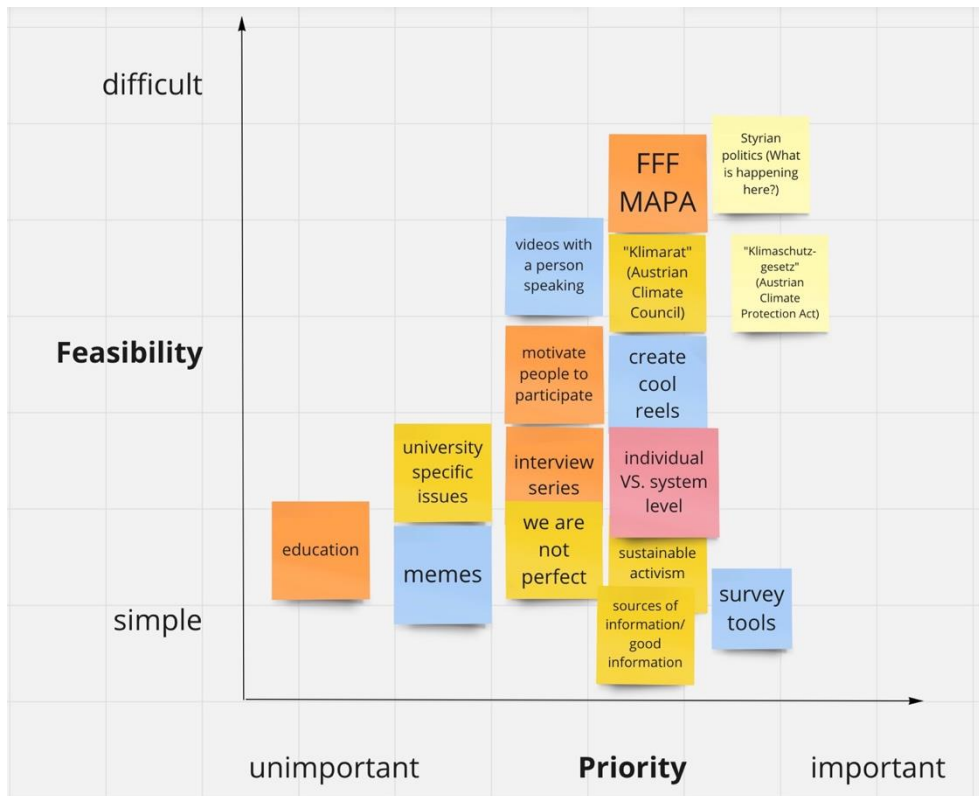
Figure 2: Ranking of topics by priority and feasibility: The participants in the first workshop (offline version) focused more on topics they wanted to display more but struggled to.
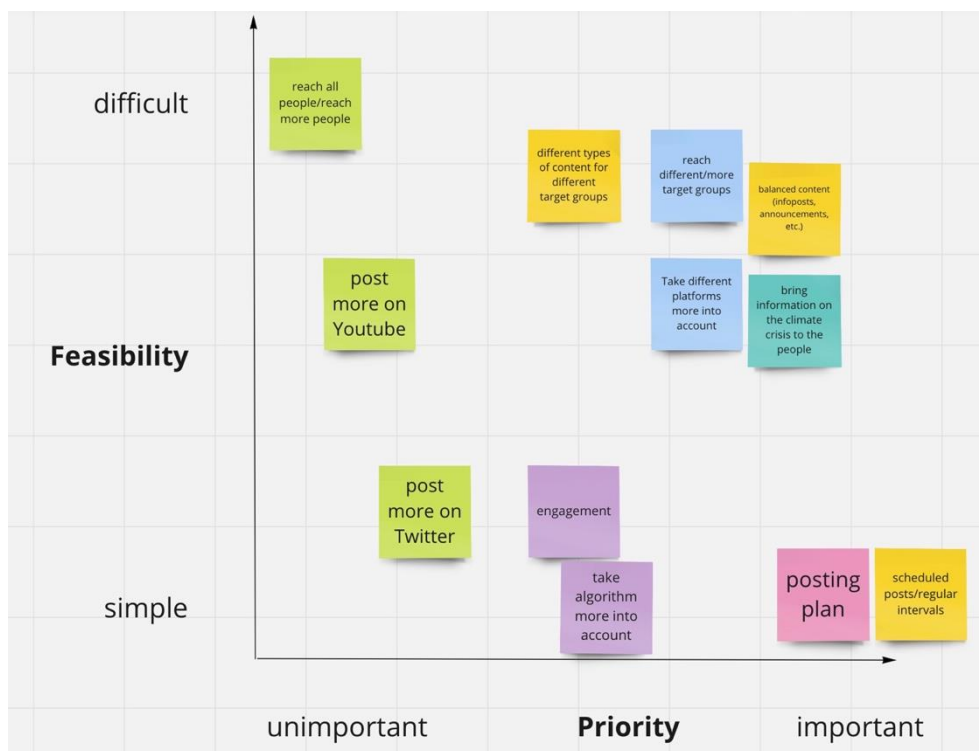

Figure 3: Ranking of topics by priority and feasibility: The participants in the first workshop (online version) focused more on organizational tasks and strategy.

In conclusion, this initial evaluation shows that ASMCs are very united and specific about their own goals, but are often in doubt about what works well for their target audiences, how to reach more and different people than they already do, how to communicate substantive issues, how to motivate people to join working groups, etc. Their initial description of who they want to reach and who they actually reach on Facebook and Instagram remains vague (see **Sec. 4.2**). During this first workshop we concluded that the fact that ASMCs do not know enough about their audiences is at the root of many challenges. As a reason for this, they describe the little time they have to deal with their audiences – either currently (who they are reaching) or strategically (who they might want to reach in the future) (e.g. Halvorson & Rach, 2012; Bloomstein 2012).

Therefore, the next card sorting process was dedicated to defining detailed gaps in knowledge about their audiences and exploring further actions to research their current audiences and implement strategic thinking.

As described in **Sec. 3.**, in the second workshop the participants drafted open questions about their current audiences and grouped these into clusters: demographic, knowledge, attitude, behaviour, and belief (see **Fig. 4**).

1. Demographic: Who feels engaged by the content on FFF's social media channels and why? How can FFF reach additional audiences?
2. Knowledge: What do the target audiences know about the climate crisis (e.g. activism, climate justice, climate-conscious behaviour, systems change)? What channels do they use to gain knowledge? Do they gain knowledge through FFF's social media channels?

3. Attitude: How do target groups perceive FFF's content? Are the topics understandable, relevant, and varied? What else do they want to see?

4. Behaviour: How and why do audiences interact with posts (like, share, save)? What content format (video, photo, graphic) triggers the most interaction? Is the text of social media posts being read? Do target groups recommend FFF's social media channels?

5. Belief: Who do audiences believe could join the FFF movement and its working groups?
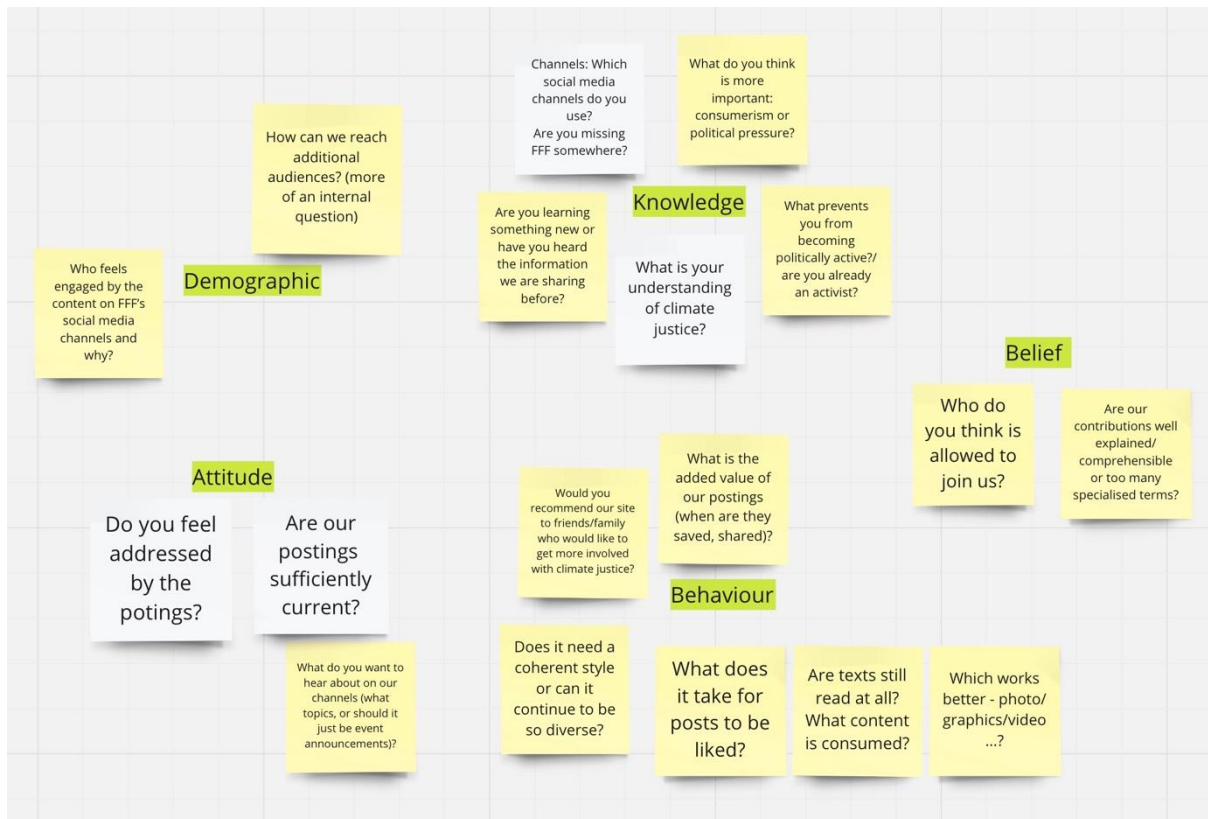
Figure 4: Second workshop: open-ended questions about FFF's target audience's demographics, knowledge, attitudes, behaviours, beliefs

4.4 Opportunities for Further Actions in Research and Other Pathways

Based on this process, we worked together to identify opportunities as well as specific methods and ways to help ASMCs address their key challenge: to find out more about their current audiences and, based on this knowledge, to come together and think strategically about whether they want to reach these people or whether there are others they want to address. To do this, we took a content strategy perspective, as one of the goals of content strategy is to research user needs and implement strategy while keeping the methods practical and delivering results quickly. The latter is especially helpful given the tight timeline of the ASMCs. For each method, advantages and disadvantages are listed in relation to the specific requirements of the FFF movement and the activists themselves.

4.4.1 Online survey

Especially after the second workshop, an online survey would be a logical next step, as existing questions could be further developed and refined for use as survey questions.

<u>Advantages:</u>

- *Distribution*: The survey could be distributed through the various channels that ASMCs already use to reach their target groups.
- *Overview of target groups*: An online survey would allow ASMCs to collect a larger amount of data from their current target groups. This could give them an overview of their target groups and serve as a starting point for further methods that go more in-depth.

<u>Disadvantages:</u>

- *Distribution*: Getting people to participate in a lengthy online survey could be a challenge, especially in fast-paced social media. In addition, algorithms on some social media platforms tend to rank posts with external links lower than other types of content, as they do not want people to leave their platform (e.g. Chawla and Chodak, 2021).
- *Time*: The setup and especially the analysis could take time ASMCs do not have.
- *Experts*: To set up and analyse the survey correctly, researchers may also be needed to assist ASMCs.
- *„Get to know" your audience*: Many content strategists advise you to put yourself in the shoes of your audience to develop the exact content that they need (e.g. Halvorson & Rach, 2012; Casey, 2015). This would require direct interaction with the audience, which is not possible through an online survey.

4.4.2 Autoethnography

An autoethnography can be described as a combination of self-reflection and exploration of others. As a first step, a participant does ethnographic work about themselves. For example, a person may self-reflect on their own information or social media behaviour. As a second step, the person compares themselves with others in order to gain new insights about themselves (Chang, 2016; Ellis et al., 2010). I would advise ASMCs to get representatives of their target groups to go through an auto-ethnography process with them.

Advantages:

- *Creative & engaging*: An autoethnography can be conducted using diverse and creative content formats. Participants can express their behaviour through videos, photos, text, drawings, etc.
- *Comparison of results*: The comparison with other participants and the related discussions can lead to relevant insights. In these discussions, ASMCs can interact with different target groups and learn about their behaviour, attitudes, beliefs, or knowledge.
- *Content for channels*: An autoethnography can be very creative in terms of content creation. Since activists are always looking for new content for their channels, they could ask participants if (part of) their autoethnography could be published on their channels.
- *Competencies:* When discussing methods during the workshops, one ASMC mentioned that they had learned about this method in their studies and would be motivated to practice it with FFF's target groups.

Disadvantages:

- *High participant commitment*: An autoethnography requires time and effort from participants. It may be a challenge for ASMCs to find people who want to make this commitment, especially from target groups that are not already highly engaged in the FFF movement.
- *High workload for ASMCs*: As this is a qualitative method, the sample should be well chosen. It should include representatives of different target groups to obtain solid results. Organizing and analysing would require time and commitment to the process, which may not be possible for ASMCs.

4.4.3 Usability testing

In usability testing, the researcher observes users while they perform a specific task, such as interacting with a piece of content, a website, a product, etc. (Krug, 2010; Lazar et al., 2017). While performing the task the researcher asks the participant to think aloud (Konrad, 2010). This process is recorded and analysed. User needs are clarified and subsequently usability problems can be identified.

Advantages:

- *Simple & fast*: The process does not require much time or preparation.
- *Quick results*: Results are visible to ASMCs as they watch participants perform a task.
- *Information about target groups + content*: Usability testing allows ASMCs to work closely with participants on a specific task. They would gain information about their target groups and get feedback on their content.

Disadvantages:

- *Audience participation*: The commitment and effort to participate in usability testing would not be as high as for an autoethnography, but participants would still have to set aside a couple of hours of their time for it and possibly meet ASMCs in person. Again, the sample should be well chosen.

4.4.4 Group Discussion and Informal Meeting

Group discussions involve a number of participants discussing a topic or (social) issue, such as climate change or activism in the case of FFF (e.g. O.Nyumba et al., 2018). This reflects the attitudes of individual people and the debates among participants.

Advantages:

- *Group setting:* With a single appointment, ASMCs can engage with a group of people, exchange views and gather feedback. For example, they could show participants a piece of content and ask them to talk about both the subject matter and the form.
- *Familiar setting:* FFF activists often discuss various topics related to climate change during their meetings. Opening this up is something they have tried before but have not been successful in doing. Putting more effort into recruiting a sample might be beneficial.
- *Content for channels*: Again, this method might inform content decisions, as ASMCs could gain insight into their current strategy and be inspired by the discussions to include topics that would also be of interest to participants.

Disadvantages:

- *Audience participation*: Again, participants do not need to be very engaged, but they still need to participate in a discussion (in person) and share their opinions. Also, the sample should reflect different target groups and opinions to create a lively discussion.
- *Moderator*: One person needs to lead and moderate the discussion. This person should have some necessary communication and social skills, such as the ability to lead a group, active listening, and flexibility (O.Nyumba et al., 2018). For example, FFF activists are experts on their topics of interest, which may make it difficult for them to listen openly to people who are not as well informed without interfering.
- *Social dynamics*: As with any group setting, social dynamics should be considered. For example, the group opinion might not reflect the single opinion of every individual as some people might be more outspoken than others, some might not feel comfortable saying what's on their mind, etc. (O.Nyumba et al., 2018).

4.5 Strategic Thinking

Once the current target group results have been collected, a final step is essential for meaningful content strategy work to continue: strategy (e.g. Halvorson & Rach, 2012; Casey, 2015). This involves relating the findings on target audiences to the communication objectives of the ASMCs. As described above, they are very clear about their own communication goals: to shed light on the climate crisis and to inspire more people to get involved in the movement (see **Sec. 4.2**). The question now is whether the current target groups are the right ones to achieve these goals. To determine this, the following questions, among others, were included in the research: What do the target audiences know about the climate crisis? Who do audiences believe could join the FFF movement and its working groups? (see **Sec. 4.3**).

The next step is to strategically assess whether the target groups already correspond to the objectives of the FFF or whether other or more target groups should be reached. This could be done, for example, in a workshop of different FFF working groups with the ASMCs, where the results are discussed or clustered using the card sorting methods described above (see **Sec. 3**). As a result, a short paper or core strategy statement (Casey, 2015) can be produced that answers the questions: What are our communication goals? Who do we want to reach (more)? This statement can guide the further content creation process. It helps to address challenges such as how to create content-rich topics that resonate with target audiences and how to motivate people to become more involved in the movement (see **Sec. 4.3**). At the same time, ASMCs ensure that the content meets the needs of the users.

5 Conclusion

In this research approach, I worked closely with activists from FFF Graz's social media and communication working group (ASMCs). Using content strategy methods, we first defined the main challenges ASMCs face in their approach to digital political participation and communication with their target groups. We concluded that many challenges have their origin in a lack of knowledge about their target groups. Therefore, in the second step, we defined more precise knowledge gaps by formulating questions and discussing opportunities for activities in research as well as further pathways. I summarised the main advantages and disadvantages of each pathway, taking into account the requirements of the FFF and my background as a content strategist. I recommend to the ASMCs that they plan an activity that:

1. Allows them to engage with their target groups (in person),
2. Does not take up too much of their resources (mainly time and effort in organisation and analysis),
3. Allows them to either collect content for their channels during the activity or at least gives them feedback on their existing content.

This would enable ASMCs to collect relevant results while making efficient use of their scarce time and resources. Subsequently, they need to be strategically rethought in order to use the results in a meaningful way. ASCMs need to consider whether the audiences they are currently reaching are in line with their communication goals, or whether they want to reach more people. Based on this, they can design content for their social media platforms that is user-centred and pursues strategic goals. Overall, this paper has applied content strategy approaches in a methodologically straightforward way to the case of FFF.

Acknowledgements

Acronyms

FFF: Fridays For Future

ASMCs: Activists participating in the social media and communication working group of FFF Graz

P1, P2, P3: Participant 1, 2, 3

List of Figures

Fig. 1: The FFF movement is successful in motivating people to participate in demonstrations. This photo was taken during the September 2021 global climate strike in Graz, Austria.

Fig. 2: Ranking of topics by priority and feasibility: The participants in the first workshop (offline version) focused more on topics they wanted to display more but struggled to.

Fig. 3: Ranking of topics by priority and feasibility: The participants in the first workshop (online version) focused more on organizational tasks and strategy.

Fig. 4: Second workshop: open-ended questions about FFF's target audience's demographics, knowledge, attitudes, behaviours, beliefs

References

Best, P., Badham, J., McConnell, T., Hunter, R.F., 2021. Participatory theme elicitation: open card sorting for user led qualitative data analysis. International Journal of Social Research Methodology 0, 1–19. https://doi.org/10.1080/13645579.2021.1876616

Bloomstein, M., 2012. Content strategy at work: real-world stories to stengthen every interactive project. Elsevier / Morgan Kaufmann.

Casey, M., 2015. The Content Strategy Toolkit: Methods, Guidelines, and Templates for Getting Content Right, 1 edition. ed. New Riders, San Francisco, California.

Chang, H., 2016. Autoethnography as Method, 0 ed. Routledge. https://doi.org/10.4324/9781315433370

Chawla, Y., Chodak, G., 2021. Social media marketing for businesses: Organic promotions of web-links on Facebook. Journal of Business Research 135, 49–65. https://doi.org/10.1016/j.jbusres.2021.06.020

Crowley, A., Moxon, D., 2017. New and innovative forms of youth participation in decision-making processes. https://edoc.coe.int/en/youth-in-europe/7625-new-and-innovative-forms-of-youth-participation-in-decision-making-processes.html

Ekman, J., Amnå, E., 2012. Political participation and civic engagement: Towards a new typology. Human Affairs 22, 283–300. https://doi.org/10.2478/s13374-012-0024-1

Ellis, C., Adams, T.E., Bochner, A.P., 2010. Autoethnografie, in: Mey, G., Mruck, K. (Eds.), Handbuch Qualitative Forschung in der Psychologie. VS Verlag für Sozialwissenschaften, Wiesbaden, pp. 345–357. https://doi.org/10.1007/978-3-531-92052-8_24

European Commission, 2021. Special Eurobarometer 513 Climate Change Report April 2021 [WWW Document]. Klimapolitik - European Commission. URL https://europa.eu/eurobarometer/surveys/detail/2273 (accessed 6.1.21).

Fridays For Future Austria, n.d. Statement zur Letzten Generation [WWW Document]. FRIDAYSFORFUTURE.AT. URL https://fridaysforfuture.at/themen/statement-zur-letzten-generation (accessed 9.13.23).

Gobo, G., Molle, A., 2017. Doing Ethnography, 2nd ed. SAGE Publications Ltd, Thousand Oaks, CA.

Halvorson, K., Rach, M., 2012. Content Strategy for the Web, 002 ed. New Riders, Berkeley, CA.

Hunecke, M., Ziesenitz, A., 2011. ManagerInnen mit grünem Herzen. Umweltpsychologie, Zusammenhänge zwischen Werten, personaler Norm, Copingstilen, Geschlechtsrollenorientierungen und dem Engagement in Umweltorganisationen sowie im privaten Umweltverhalten von UmweltaktivistInnen 15 (2011).

Konrad, K., 2010. Lautes Denken, in: Mey, G., Mruck, K. (Eds.), Handbuch Qualitative Forschung in der Psychologie. VS Verlag für Sozialwissenschaften, Wiesbaden, pp. 476–490. https://doi.org/10.1007/978-3-531-92052-8_34

Kozinets, R.V., 2020. Netnography, The Essential Guide to Qualitative Social Media Research, 3e.

Krug, S., 2010. Web Usability: rocket surgery made easy. Addison-Wesley, München.

Kuckartz, U., 2018. Qualitative Inhaltsanalyse. Methoden, Praxis, Computerunterstützung, 4., überarbeitete. ed. Beltz Juventa, Weinheim Basel.

Lazar, J., Feng, J.H., Hochheiser, H., 2017. Research Methods in Human-Computer Interaction, 2nd ed. Morgan Kaufmann, Cambridge, MA.

Mesibov, M., 2019. Defining Content Strategy as a Practice for Engagement. Technical Communication 66, 137–146.

Neas, S., Ward, A., Bowman, B., 2022. Young people's climate activism: A review of the literature. Front. Polit. Sci. 4, 940876. https://doi.org/10.3389/fpos.2022.940876 Bergold, J., Thomas, S., 2010. Partizipative Forschung, in: Mey, G., Mruck, K. (Eds.), Handbuch Qualitative Forschung in der Psychologie. VS Verlag für Sozialwissenschaften, Wiesbaden, pp. 333–344. https://doi.org/10.1007/978-3-531-92052-8_23

O.Nyumba, T., Wilson, K., Derrick, C.J., Mukherjee, N., 2018. The use of focus group discussion methodology: Insights from two decades of application in conservation. Methods Ecol Evol 9, 20–32. https://doi.org/10.1111/2041-210X.12860

O'Brien, K., Selboe, E., Hayward, B.M., 2018. Exploring youth activism on climate change: dutiful, disruptive, and dangerous dissent. Ecology and Society 23.

SGuin, C., Pelletier, L.G., Hunsley, J., 1998. Toward a Model of Environmental Activism. Environment and Behavior 30, 628–652. https://doi.org/10.1177/001391659803000503

Theocharis, Y., 2015. The Conceptualization of Digitally Networked Participation. Social Media + Society 1, 2056305115610140. https://doi.org/10.1177/2056305115610140

Vaughn, L.M., Jacquez, F., 2020. Participatory Research Methods – Choice Points in the Research Process. Journal of Participatory Research Methods 1. https://doi.org/10.35844/001c.13244

Vissers, S., Stolle, D., 2014. Spill-Over Effects Between Facebook and On/Offline Political Participation? Evidence from a Two-Wave Panel Study. Journal of Information Technology & Politics 11, 259–275. https://doi.org/10.1080/19331681.2014.888383

Waeterloos, C., Walrave, M., Ponnet, K., 2021. Designing and validating the Social Media Political Participation Scale: An instrument to measure political participation on social media. Technology in Society 64, 101493. https://doi.org/10.1016/j.techsoc.2020.101493

Wahlström, M., Sommer, M., Kocyba, P., de Vydt, M., De Moor, J., Davies, S., Wouters, R., Wennerhag, M., van Stekelenburg, J., Uba, K., Saunders, C., Rucht, D., Mickecz, D., Zamponi, L., Lorenzini, J., Kołczyńska, M., Haunss, S., Giugni, M., Gaidyte, T., Doherty, B., Buzogany, A., 2019. Protest for a future: Composition, mobilization and motives of the participants in Fridays for Future climate protests on 15 March, 2019 in 13 European cities [WWW Document]. Keele University. URL https://eprints.keele.ac.uk/6571/ (accessed 11.18.21).

Wallis, H., Loy, L.S., 2021. What drives pro-environmental activism of young people? A survey study on the Fridays For Future movement. Journal of Environmental Psychology 74, 101581. https://doi.org/10.1016/j.jenvp.2021.101581

Data Journalism Training – Data & Visualisation Challenges

Sonja Radkohl[1], Eva Goldgruber[1]

[1]Institute of Journalism and Digital Media, University of Applied Sciences,
FH JOANNEUM, Graz, Austria

Abstract. Within the last years, an increasing use of data in journalism can be observed which is linked to the general datafication of society and the digital transformation of journalism. Especially during the COVID-19 pandemic, the competencies to successfully process, interpret and evaluate complex data and data visualisations have gained significance. This societal need to address a large-scale pandemic journalistically has led to an increased use of data stories. Despite a growing need for data journalism skills, the field lacks standardized education or a defined skill set. Training programmes are emerging, and this paper focuses specifically on the challenges that arise when such new offerings are created.

We conducted 10 interviews with data journalism trainers in Austria, Germany, and Switzerland (fall 2020 till spring 2021). Results indicate that among trainers working with data is seen as more challenging than designing and interpreting visualisations. Most challenges emerge at the very beginning. For instance, it is demanding for participants to understand and find a story in a data set, or to clean and process data. In addition, visualisations bring about their own challenges: They are often underestimated, as journalists expect quick solutions whereas the reality is much more complex and comprehending.

Overall, we see a great variety of needs and goals within data journalism training, ranging from simple challenges to complex tasks. Those are highly dependent on the usage of certain analytics methods and visualisation types. Therefore, in the training context sensitivity is mandatory to make a relevant contribution to the field.

1 Introduction

One of the most important responsibilities journalists ascribe to themselves is to act as the "fourth estate" in a democracy, exercising a control function by reporting critically on the legislative, executive and judicial branches of government. For decades, they have acted as gatekeepers between citizens and those in power, filtering and presenting news relevant to the formation of public opinion. Web 2.0 and social media (algorithms) have

drastically changed this by allowing anyone to create and distribute information. Although the circumstances have changed, there is still a societal need for journalism, especially when it comes to filtering information overload and presenting it in a way that the public can understand (e.g., Bruns, 2018).

In addition to this digital transformation, scholars attribute another trend to a changing society, which they refer to as the "datafied society". This term describes the increasing collection and use of (big) data, which has various societal consequences, from new research opportunities to data protection issues (Schäfer and van Es, 2017). COVID-19 encouraged these trends, as it is often presented through complex data visualisations (Ramsälv et al., 2023).

Both societal developments provide ideal conditions for data journalism. Data journalists explain complex data to the public through (digital) stories, fulfilling their role as gatekeepers in a "datafied society". They need to successfully analyse, interpret, and comprehend complex data and data visualisations – skills that "traditional" journalists with a background in humanities often lack. It is therefore crucial to create new training programmes that address the characteristics of data-intensive work to prepare future data journalists accordingly. This paper focuses specifically on the challenges of creating such new offerings by interviewing data journalism trainers. We also draw implications that could inform new training opportunities, such as onboarding, a self-learning method that considers the settings in which learning takes place.

2 Background: The Field of Data Journalism

2.1 Data Journalism Skills

Before considering data journalism training, it is important to define the general skills of a data journalist. The work of a data journalist can range from finding and creating stories (data storytelling), data-driven strategies for data research and analysis (data literacy), methods for visualisation (visualisation literacy), and generally the creative but critical use of data (Burns & Matthews, 2018; Feigenbaum et al., 2016; Graham, 2015, 2018; Heravi, 2017; J. Hewett, 2017; Zhu & Du, 2018). The need for these skills is confirmed by the annual data journalism survey, "The State of Data Journalism" (2022). According to these results, skills related to working with data seem to be rated slightly more important than those related to visualisations (State of Data Journalism, 2022). Also, more participants seem to work with data than with visualisations: Three out of four stated that they need to analyse data, 62% collect data and 45% clean data, while only 54% create data visualisations themselves and less than a third of them use technical or

programming skills. Furthermore, these are defined as new skills that could help journalists to be more agile towards new trends and changes in the field (Bradshaw, 2018; Kirchhoff & Renger, 2019).

However, there seems to be a gap between the skills, data journalists say they should have and the skills they think they possess. In the same survey, data journalists rated their skills in journalism as "advanced", in data analysis and visualisation as "novice" and "intermediate" and in data wrangling, scraping and programming as little or none (State of Data Journalism, 2022).

2.2 Data Journalism Backgrounds

This lack of data-specific skills may be due to the different backgrounds of data journalists. Most are trained and work in "traditional" journalism, with only some having a background in statistics or data science (Graham, 2015; State of Data Journalism, 2022; Zhu & Du, 2018). Data journalism skills are still largely undervalued: Many have not received data journalism training in higher education and have had to learn the skills themselves, with many being completely self-taught (Heravi & Lorenz, 2020, Kennedy et al., 2021; Kõuts-Klemm, 2019; State of Data Journalism, 2022). This is reflected in the areas in which data journalists want to be trained: data visualisation, data analysis, machine learning, and data wrangling (State of Data Journalism, 2022).

2.3 Changing the Field of Data Journalism: COVID-19

The COVID-19 pandemic has led to one of the most rapid changes in the field of data journalism. Data journalism has not only been provided with major opportunities, such as the accessibility of large data sets, but it has also "gained significance and legitimacy during the COVID-19 pandemic" (Ramsälv et al., 2023). Data journalists addressed the societal need to make sense of a global pandemic through complex data sets. However, new challenges were emerging, such as managing and addressing data uncertainty in their stories, presenting and explaining complex data and data connections as well as the risk of reporting fake news (Westlund & Herminda, 2021, Desai et al, 2021; Quandt & Wahl-Jorgensen, 2021).

2.4 Challenges in Data Journalism Training

These realities of data journalism present several challenges for training data journalists. First, there is a lack of time and economic opportunity in the daily work of journalists for upskilling or training: they must fulfil their duty to report daily stories first, and can only be trained in new skills after that (State of Data Journalism, 2022). The same applies to teachers. They are often former journalists with little or no experience in data work. They

often have to learn data journalism skills on the job, with little time or opportunity to do so. This is changing, however, as more data journalists offer training rather than having it done by journalism trainers. (Davies & Cullen, 2016; Hannis, 2018; Heravi, 2019; Hewett, 2016; Treadwell et al., 2016; State of Data Journalism, 2022).

Second, many challenges are related to the data-intensive work that journalists are often not used to. The reluctance of many journalists to work with mathematics and statistical data work is cited as one of the biggest challenges in teaching data journalism: "Journalists are trained to write stories, not in statistics or coding, however" (Reilly, 2017, p. 8). As a starting point, they need to find data to work with, often using open data sources (Aitamurto et al., 2011; Karlsen and Stavelin, 2014; Loosen et al., 2015; Reilly, 2017). The most common sources are government sources (Open Government), followed by non-commercial organizations such as universities, research institutes or NGOs, or press releases from private companies. Less frequently, leaked data such as the Panama Papers data or social media data are mentioned. In rare cases, data is collected by the media itself, but more often media-specific data comes from surveys or pre-existing data from archives or recipient counts (Beiler et al., 2020; Loosen et al., 2017; Stalph, 2018; Tandoc Jr. and Oh, 2015; Zamith, 2019).

Concerning the data itself, students and faculty alike face challenges in understanding the authenticity of data, as well as the ethical and legal issues surrounding data privacy (Burns & Matthews, 2018; Graham, 2015; Lewis et al., 2020). Data and statistical methods are often perceived as objective and independent, but on closer inspection, they are never completely unbiased because people create and (unintentionally) influence the data and have their own agendas. (Tandoc Jr. and Oh, 2015; Tong and Zuo, 2019). The absurdity of the supposed objectivity of data is demonstrated by Hill (2020): She examined graphs on abortion and showed how, for example, shortcuts, misleading interpretations, the use of far too small data sets, and the dehumanization of women can be used to manipulate recipients and force a strong negative emotion toward abortion. In particular, predetermined data categories and structures are rarely questioned by journalists (Lowrey et al., 2019; Lowrey and Hou, 2018): "Critical voices say that journalists depend on the information they get, and often the pieces of information they get are already 'framed'" (Kõuts-Klemm, 2019, p. 301). The same is true for transparency: while data sources are sought and recognized as a quality feature, they are often poorly implemented (Loosen et al., 2015, 2017; Stalph, 2018; Tandoc Jr. and Oh, 2015; Young et al., 2018; Zamith, 2019). Also, by no means all data projects use at least two sources (Loosen et al., 2017; Stalph, 2018; Zamith, 2019).

Working with data is exactly where training should focus, but this is again complicated by the scarcity of classroom time. (Bradshaw, 2018; Davies & Cullen, 2016; Graham, 2018; Hannis, 2018; Hewett, 2016; Treadwell et al., 2016). Also, linking the lengthy data work

to the story at the end to increase student motivation is challenging. Results are often not visible until late in the process (Graham, 2015; Hewett, 2016).

2.5 Addressing Challenges in Data Journalism Training

It is therefore important that teaching addresses these issues and provides different approaches to working with data and visualisations (Bradshaw, 2018; Burns & Matthews, 2018). Many authors cite the need for more qualifications and regulated processes. Especially in the field of data and statistics, there is a lack of expertise and critical thinking. Investing in education and training here would raise the level of data handling skills (Lowrey et al., 2019; Stalph, 2018).

One possibility is to establish methods related to data work as journalism methods (such as the interview method), for example by starting with them at the beginning of training (Burns & Matthews, 2018; Bradshaw, 2018; Heravi, 2017; Hewett, 2016). Data handling, they argue, is the foundation for further steps such as scraping, data cleaning and analysis, visualisation and, ultimately, telling data stories (Constantaras, 2016). This approach can be summarised as teaching computational thinking from the very beginning: understanding computation and being able to critically question it (Burns & Matthews, 2018; Hewett, 2017; Lewis et al., 2020).

Another way to motivate students is the opposite of the previous one: To help students see that working with data is about telling stories, start the data journalism journey away from the goal and begin with visualisation and storytelling. This makes it easier for them to focus on topics and choose those that are of personal interest to them, increasing their motivation (Bradshaw, 2018).

In general, projects should be published and thus consumed by real recipients (Fuller, 2018; Graham, 2015). With these approaches data journalism can be introduced as an attractive career option (Weiss & Retis-Rivas, 2018).

3 Methods

To address the challenges of data journalism training, we conducted semi-structured interviews with journalism trainers in the German-speaking areas of Europe (Austria, Germany and Switzerland). We chose the interview method because of the possibility of having exploratory and in-depth conversations about the challenges trainers face. In addition, we know from our previous research on data journalism that it is easier to persuade data journalists to speak with us than to fill in a lengthy survey. 17 interview

requests were answered by 10 participants. The interviews were conducted via Zoom from autumn 2020 to spring 2021.

We aimed for maximum variation within the sample. We included participants from different German-speaking countries: 3 participants worked in Austria, 3 in Germany, and 4 in Switzerland. We also wanted to balance our sample as much as possible in terms of gender. It was very easy for us to reach male trainers, but our initial requests were only answered by one female data journalist. Therefore, we specifically searched for female trainers and managed to interview 4 female and 6 male trainers in total. This is in line with the annual data journalism survey "The State of Data Journalism" (2022), where 58% of participants identified as male, 40% as female and 1% as non-binary/genderqueer. 9 of the trainers we interviewed were working as a (data) journalist daily in addition to teaching data journalism.

The interviews lasted between 29 and 65 minutes and were recorded and subsequently transcribed using standard German orthography. The data was analysed using Kuckartz's (2018) content structuring content analysis with a priori categories and computer-assisted with QCAmap software.

For the sake of clarity, in the following results section, we use the term "trainers" to refer to the 10 participants in our interviews – data journalism trainers who gave us insights into their approach to data journalism and how they run training courses. The term "participants" is used to refer to those the trainers are talking about: the aspiring data journalists who attend their trainings. We translated direct quotes into English.

4 Results

4.1 Data Journalism Training – An Overview

In general, trainers describe two types of training: The first type involves working with data analysis and data visualisation tools. These courses tend to be shorter and provide an overview of the field of data journalism and the methodologies used. In the second course type, participants learn programming – mostly for data processing and analysis but also for data visualisation. These tend to take more time and effort than courses that work with tools that guarantee faster results but are limited in their functionality.

Most courses have a general data journalism knowledge base at the beginning. They offer practical examples of stories, but there are also meta-discussions about the field, i.e., about approaches, tools, forms of presentation or methods. Although there is no set workflow for data journalism, there are certain steps that practitioners and scholars agree

on (Bradshaw, 2011; Lee et al., 2015; Riche et al., 2018; Stoiber et al., 2019; Uskali und Kuutti, 2015). Courses tend to follow these steps, from an initial idea to publication:

1. finding and researching stories and data sets,
2. source criticism,
3. data sourcing/gathering/collection and preparation,
4. (visual) analysis and basic (descriptive) statistics,
5. building visualisations for readers and telling the final story.

This workflow is presented at the beginning of the course but will not be strictly followed later, as participants should learn to use techniques and tools in a variable and flexible way. For example, sometimes the starting point may be an interesting data set or a type of visualisation a data journalist wants to use.

4.2 Challenges of Data Journalism Training in General

The first major challenge in data journalism training mentioned was dealing with the different backgrounds of the participants. Trainers describe that some participants have a basic understanding of working with data or basic statistical skills. Others have an aversion to mathematics and data, and corresponding difficulties in abstract thinking, or even problems in finding suitable data sets, or in dealing with operational software such as Excel. When students face such difficulties, the already high effort required to familiarize oneself with the complex topic of data journalism becomes even higher and, in some cases, unattainable. These different backgrounds are also frequently mentioned in the literature as cited in Sec. 2.2, with the literature further highlighting that more people have a journalism background than a background in statistics or data science.

4.2.1 Frequently Asked Questions

The diverse backgrounds are reflected in the frequently asked questions by participants. Questions are very individual and relate to specific problems in their process, i.e., concerning tools and how to use them. It is essential to answer those questions because if someone loses the thread, they will not be able to keep up later, and some people will not be able to complete tasks without this individual support. Trainers cite specific questions such as: How do I get out of a row in Excel? Why are the numbers separated by a period and not a comma? How does a formula work? Why does my visualisation tool incorrectly recognize numbers as text? How do I adjust colours? How do I integrate the final visualisation into my own blog or editing tool?

Again, trainers mention that participants often lack basic skills, such as technical computer literacy or (creative) storytelling with data and visualisations. Participants also frequently ask questions about abstraction and orientation: They lack the ability to navigate large data sets or to reproduce a task in a similar way. This would be easier if

they could program. However, they often do not see the benefit of learning programming skills when – at least at first glance – it is so much easier to work with spreadsheets.

4.2.2 Building a Common Ground

Accordingly, it is challenging for trainers to create a common ground for all participants to work together and to find the right pace in the course. It is a challenge not to leave anyone behind, but also not to bore the participants. One trainer described: "It's quite difficult to teach everything they actually need to be able to use it and still not do too much." (IP 8). The right amount and the right form of input were also mentioned: For example, creative problem-solving is better learned through examples than through pure theory.

4.2.3 Data Journalism in a Daily Work Routine

The transfer of knowledge to the participant's daily work routine is particularly important in training: No journalist attends a training course out of pure interest in data journalism. They expect a direct benefit for their daily work as journalists. Trainers, therefore, face the challenge of selecting content and difficulty levels that are frequently encountered in everyday journalism. They also need to motivate participants to apply their knowledge later: No matter how intensive a training program is, participants have to teach themselves, make mistakes, and research how to solve problems, in order to become familiar with the complex field of data journalism and become data journalists. This point is also supported by the literature, which states that a key point for the successful training of data journalists is to establish methods related to data work as a journalism method that is used regularly, similar to other methods such as interviews (see section 2.5).

4.3 Challenges Related to Data and Data Work

When comparing specific challenges related to data and data work with challenges related to visualisations, trainers rated the former as more challenging than the latter. One reason for this may be that a large part of data journalism work, in general, involves working with data – from researching data and finding stories in data to analysing data and testing hypotheses, etc. The literature also sees data handling skills as slightly more important than visualisation skills (see Sec. 2.1) and cites many journalists' aversion to mathematics as a barrier to training data journalists (see Sec. 2.4).

Challenges related to data work start at the very beginning of a data journalism process: finding the right data set. In terms of source, trainers use 1) provided data and open source data (government, offices, open data portals), 2) researched data (through calls, queries) and collected data (scraping, building database), 3) self-collected data (together with scientists or through a call for a story), and 4) data from platforms or sensors (overall

similar to the sources mentioned in Literature, see Sec. 2.4). Different story angles or questions require different data sets. Often, there is no one perfect data set for a story, and participants will need to be creative in approaching their questions, for example by combining datasets. In particular, critically analysing a source, as well as questioning and understanding the context of a source (who provided the data and what was the intention) is very challenging for students. As they often have problems finding a source, finding a second one for corroboration is equally challenging.

Once a data set has been selected, the challenges become even more demanding. Almost all trainers cited data cleaning and processing when data formats are unstructured or non-machine-readable as key challenges for participants. Data cleaning in particular can be time-consuming and is often underestimated by participants. As a result, many fail to get the data into the right form for further analysis.

Next, the analysis must be done correctly. Many trainers recommend not using complex statistical methods. It is very difficult to choose the right one and it is too easy to make mistakes. This should be the job of scientists who have been properly trained and know how to use statistical methods correctly.

Usually one must "jump in at the deep end" (IP 3) with data work, since there are no predefined approaches for learning data work. One reason for this might be that questions and problems in data work are very individual and vary from case to case, both in terms of the data itself and the chosen method of analysis. For this reason, training is often self-study.

4.4 Challenges Related to Visualisations

As mentioned above, trainers describe working with visualisations as less challenging than working with data. Also, the literature tends to describe barriers more in terms of data and less in terms of visualisations (see Sec. 2.1). This may be due to the role of visualisations in data journalism work. They are used for two reasons: first and foremost as an output format to tell a data story and to make it understandable. For this purpose, less complex visualisations are used so as not to overwhelm readers (e.g. Beiler et al., 2020; Loosen et al., 2017; Stalph, 2018; Tandoc Jr. & Oh, 2015). Second, visualisations are used as an analytical tool (visual analytics), i.e., when data is very complex, to get an overview of the data (Keim et al., 2010; Mathisen et al., 2019; Stoiber et al., 2019).

However, trainers still describe difficulties with visualisation work. First, it is a challenge to find the right visualisation for a data set and the story a data journalist wants to tell. This is especially challenging for new data journalists who may not have experience with which types of visualisations are understandable to readers or what their informative

value is. Especially design and colours have a great impact and can strongly influence statements.

Second, data journalists must decide whether to use a tool or create a custom visualisation. Tools offer quick results, but data must be processed correctly to use a particular tool. Also, tools can be expensive and are limited in the types of visualisations or designs that can be created. Programming offers many more possibilities but requires certain skills and can be much more time-consuming.

In conclusion, the participants' expectation of visualisations is that they can be created fast and effectively, but the reality is much more complex and demanding.

4.5 Methods to Meet the Challenges

Finally, trainers note that there is no perfect support when it comes to the challenges of working with data and visualisations. However, trainers identify guidelines that they use throughout the process and adapt to individual questions. They agree with the literature that data work should be established as another research method in journalism (see Sec. 2.5).

First, they describe the added value of a live presentation over a recording. Here it is particularly important to address examples (best and worst practices) and to demonstrate the data journalism process live. The focus is on trying out methods yourself, researching errors yourself, or learning from peers in small groups through a personal exchange. It is important to create a culture where questions can be asked at any time during and after the course.

Second, handouts or cheat sheets are also distributed after the course. These include specific commands, solutions to common problems, uses of different diagram types, ways to access data, pitfalls in data cleansing, etc. If programming is taught, coding notebooks (including documentation) in a particular programming language are used. In addition, most trainers hand out collections of links to tutorials, videos, articles, literature, applications, tool collections, etc. These resources help participants to learn on their own and integrate data journalism into their daily work, which is a crucial step after the initial training to become a data journalist.

4.6 COVID-19 – Changing the Field?

For COVID-19, the trainers are divided on the extent to which the pandemic has changed the field of data journalism. In any case, data journalism and data itself have become more visible, which inevitably triggers discussions and debates – also about the role of the media in society and the responsibility and power of journalists. Data literacy among journalists has presumably increased, as the pandemic has increased the need for data-

driven stories. Awareness of what data means, what challenges data can bring, what a meaningful visualisation entails, and how to read data visualisations are also being discussed more broadly in some cases. Trainers disagree about whether readers' data and visualisation literacies have increased. To some extent, it is possible to "expect" (IP 10) more from readers, for example, data journalists include R-values or exponential growth in their stories. In this context, it is particularly important to critically examine and explain the limitations and possible errors of data (analysis) and visualisations. Here, too, scientists address the new challenges posed by the pandemic, but overall they seem to see greater opportunities for data journalism than the trainers we interviewed, who were more cautious in their optimism (see Sec. 2.3).

5 Conclusion

In conclusion, the field is very diverse in terms of, needs, tasks, tools and resources used. The literature and our interviews show that data journalists come from different backgrounds and have different approaches to doing data journalism, i.e. focusing solely on tools or programming. As a result, the challenges related to data and visualisations are also highly dependent on the use of data, data sets, analysis, visualisation methods, etc. Nevertheless, some conclusions can be drawn for the further enhancement of data journalism education.

Our interviews as well as the literature show that there should be a combination of training in the beginning followed by autodidactic learning. Initial training is important to make data journalism more accessible and to avoid beginners feeling overwhelmed by the complexity of working with data and visualisations. These initial training should:

- Have a focus on data work as this is more challenging than creating visualisations, especially in the beginning.
- Still include a part where visualisations are discussed. Beyond the question of how to properly visualise a data story, visualisations could play a role earlier in the process, using the method of visual analysis, where visualisations can be used to get (quick) results or to get an overview of a data set and the stories it might contain.
- Allow enough time for open questions, which can vary depending on the story, the data set, the approach, the background of the participants, etc.
- Prepare different resources to bridge the gap to the second part of learning data journalism: self-learning.

Later, there is the process of self-learning, in which the knowledge acquired in a training course must be applied to everyday (data) journalism work. Trainers and literature agree

that one training course does not make a data journalist. Skills can only be internalised and developed if they are used frequently. A concept that could enhance this process is "onboarding". Onboarding is a self-learning method that considers a person's environment, such as the tools they use. Basically, people learn how to use something while simultaneously using it. This could be particularly well suited to data journalism, as context sensitivity is often cited as very important in learning: providing help and training at the very moment a question arises.

This paper is part of the research project "SEVA – Self-Explanatory Visual Analytics for Data-Driven Insight Discovery" (FFG, 2020–2023).

6 Limitations

This paper focuses on challenges in data journalism training by using the method of semi-structured interviews with trainers in the field of data journalism. Our sample is limited to the German-speaking area and could be extended or compared to other areas. Also, the results could be verified using another methodological approach, such as a survey or newsroom observations. In our interviews, we focused on the challenges of data journalism training and the COVID-19 pandemic but did not include topics such as artificial intelligence (AI) and its impact on data journalism. Some articles have already discussed the opportunities and challenges of AI for data journalism, i.e. in terms of objectivity, accuracy, speed, combating fake news, etc (Biswal, 2023; Frąckiewicz, 2023). Research on the use of AI in data journalism could yield interesting results for the future of data journalism education.

References

Aitamurto, T., Sirkkunen, E., Lehtonen, P., 2011. Trends in data journalism.

Beiler, M., Irmer, F., Breda, A., 2020. Data Journalism at German Newspapers and Public Broadcasters: A Quantitative Survey of Structures, Contents and Perceptions. Journalism Studies 1–19. https://doi.org/10.1080/1461670X.2020.1772855

Biswal, S.K., 2023. Future of AI in data journalism is unclear. The Pioneer.

Bradshaw, P., 2018. Data journalism teaching, fast and slow. Asia Pacific Media Educator 28, 55–66.

Bruns, A., 2018. Gatewatching and news curation: Journalism, social media, and the public sphere (Digital Formations, Volume 113). Peter Lang Publishing, New York.

Burns, L.S., Matthews, B.J., 2018. First Things First: Teaching Data Journalism as a Core Skill. Asia Pacific Media Educator 28, 91–105. https://doi.org/10.1177/1326365X18765530

Constantaras, E., 2016. The Potential and Reality of Data Journalismin Developing Media Markets. Internews.

Davies, K., Cullen, T., 2016. Data Journalism Classes in Australian Universities: Educators Describe Progress to Date. Asia Pacific Media Educator 26, 132–147. https://doi.org/10.1177/1326365X16668969

Desai, A., Nouvellet, P., Bhatia, S., Cori, A., Lassmann, B., 2021. Data journalism and the COVID-19 pandemic: opportunities and challenges. The Lancet Digital Health 3, e619–e621. https://doi.org/10.1016/S2589-7500(21)00178-3

Feigenbaum, A., Thorsen, E., Weissmann, D., Demirkol, O., 2016. Visualising data stories together: Reflections on data journalism education from the Bournemouth University Datalabs Project. Journalism Education 5, 59–74.

Frąckiewicz, M., 2023. The Future of Journalism with AI and Data Journalism. TS2 SPACE.

Fuller, G., 2018. Enthusiasm for Making a Difference: Adapting Data Journalism Skills for Digital Campaigning. Asia Pacific Media Educator 28, 112–123. https://doi.org/10.1177/1326365X18768134

Graham, C., 2018. A DIY, Project-based Approach to Teaching Data Journalism. Asia Pacific Media Educator 28, 67–77. https://doi.org/10.1177/1326365X18768308

Graham, C., 2015. By the numbers: Data journalism projects as a means of teaching political investigative reporting. Asia Pacific Media Educator 25, 247–261.

Hannis, G., 2018. Teaching data journalism in New Zealand. Asia Pacific Media Educator 28, 124–130.

Heravi, B.R., 2019. 3Ws of Data Journalism Education. Journalism Practice 13, 349–366. https://doi.org/10.1080/17512786.2018.1463167

Heravi, B.R., 2017. Teaching Data Journalism. Abramis Academic Publishing.

Heravi, B.R., Lorenz, M., 2020. Data Journalism Practices Globally: Skills, Education, Opportunities, and Values. Journalism and Media 1, 26–40.

Hermida, A., Young, M.L., 2019. Data Journalism and the Regeneration of News, 1st ed. Routledge. https://doi.org/10.4324/9781315163895

Hewett, J., 2017. Collaborative learning: from CAR to data journalism and Hacks/Hackers.

Hewett, J., 2016. Learning to teach data journalism: Innovation, influence and constraints. Journalism 17, 119–137. https://doi.org/10.1177/1464884915612681

Hill, R.L., 2020. What is at stake in data visualization?: A feminist critique of the rhetorical power of data visualizations in the media, in: Engebretsen, M., Kennedy, H. (Eds.), Data Visualization in Society. Amsterdam University Press, pp. 391–406. https://doi.org/10.2307/j.ctvzgb8c7.29

Karlsen, J., Stavelin, E., 2014. Computational Journalism in Norwegian Newsrooms. Journalism Practice 8, 34–48. https://doi.org/10.1080/17512786.2013.813190

Kennedy, H., Engebretsen, M., Hill, R.L., Kirk, A., Weber, W., 2021. Data visualisations: Newsroom trends and everyday engagements. The Data Journalism Handbook: Towards a Critical Data Practice 162–173.

Kirchhoff, S., Renger, R., 2019. Die österreichische Journalistenausbildung im Kontext einer veränderten Berufswelt (Kurzbericht).

Kõuts-Klemm, R., 2019. Data literacy among journalists: A skills-assessment based approach. cejc 12, 299–315. https://doi.org/10.19195/1899-5101.12.3(24).2

Kuckartz, U., 2018. Qualitative Inhaltsanalyse. Methoden, Praxis, Computerunterstützung, 4., überarbeitete. ed. Beltz Juventa, Weinheim Basel.

Lee, B., Riche, N.H., Isenberg, P., Carpendale, S., 2015. More Than Telling a Story: Transforming Data into Visually Shared Stories. IEEE Computer Graphics and Applications 35, 84–90. https://doi.org/10.1109/MCG.2015.99

Lewis, N.P., McAdams, M., Stalph, F., 2020. Data Journalism. Journalism & Mass Communication Educator 75, 16–21. https://doi.org/10.1177/1077695820904971

Loosen, W., Reimer, J., De Silva-Schmidt, F., 2017. Data-driven reporting: An on-going (r)evolution? An analysis of projects nominated for the Data Journalism Awards 2013–2016. Journalism: Theory, Practice & Criticism 146488491773569. https://doi.org/10.1177/1464884917735691

Loosen, W., Reimer, J., Schmidt, F., 2015. When data become news: A content analysis of data journalism pieces, in: Proceedings of the Future of Journalism 2015 Conference. Presented at the The Future of Journalism 2015 Conference, Cardiff.

Lowrey, W., Broussard, R., Sherrill, L.A., 2019. Data journalism and black-boxed data sets. Newspaper Research Journal 40, 69–82. https://doi.org/10.1177/0739532918814451

Lowrey, W., Hou, J., 2018. All forest, no trees? Data journalism and the construction of abstract categories. Journalism 1464884918767577.

Mathisen, A., Horak, T., Klokmose, C.N., Grønbæk, K., Elmqvist, N., 2019. InsideInsights: Integrating Data-Driven Reporting in Collaborative Visual Analytics. Computer Graphics Forum 38, 649–661. https://doi.org/10.1111/cgf.13717

Quandt, T., Wahl-Jorgensen, K., 2021. The Coronavirus Pandemic as a Critical Moment for Digital Journalism: Introduction to Special Issue: Covering Covid-19: The Coronavirus Pandemic as a Critical Moment for Digital Journalism. Digital Journalism 9, 1199–1207. https://doi.org/10.1080/21670811.2021.1996253

Ramsälv, A., Ekström, M., Westlund, O., 2023. The epistemologies of data journalism. New Media & Society 146144482211504. https://doi.org/10.1177/14614448221150439

Reilly, S., 2017. The Need to Help Journalists with Data and Information Visualization. IEEE Computer Graphics and Applications 37, 8–10. https://doi.org/10.1109/MCG.2017.32

Riche, N.H., Hurter, C., Diakopoulos, N., Carpendale, S. (Eds.), 2018. Data-driven storytelling, A K Peters Visualization Series. CRC Press/Taylor & Francis Group, Boca Raton, Florida.

Schäfer, M.T., van Es, K. (Eds.), 2017. The Datafied Society. Studying Culture through Data. Amsterdam University Press. https://doi.org/10.5117/9789462981362

Stalph, F., 2018. Classifying Data Journalism. Journalism Practice 12, 1332–1350. https://doi.org/10.1080/17512786.2017.1386583

State of Data Journalism, 2022.

Stoiber, C., Rind, A., Grassinger, F., Gutounig, R., Goldgruber, E., Sedlmair, M., Emrich, Š., Aigner, W., 2019. netflower: Dynamic network visualization for data journalists, in: Computer Graphics Forum. Wiley Online Library, pp. 699–711.

Tandoc Jr., E.C., Oh, S.-K., 2015. Small departures, big continuities? Norms, values, and routines in The Guardian's big data journalism. Journalism Studies. https://doi.org/10.1080/1461670X.2015.1104260

Tong, J., Zuo, L., 2019. The Inapplicability of Objectivity: Understanding the Work of Data Journalism. Journalism Practice 0, 1–17. https://doi.org/10.1080/17512786.2019.1698974

Treadwell, G., Ross, T., Lee, A., Lowenstein, J.K., 2016. A numbers game: Two case studies in teaching data journalism. Journalism & Mass Communication Educator 71, 297–308.

Uskali, T.I., Kuutti, H., 2015. Models and streams of data Journalism. The Journal of Media Innovations 2, 77–88.

Weiss, A.S., Retis-Rivas, J., 2018. 'I Don't Like Maths, That's Why I am in Journalism': Journalism Student Perceptions and Myths about Data Journalism. Asia Pacific Media Educator 28, 1–15. https://doi.org/10.1177/1326365X18780418

Westlund, O., Herminda, A., 2021. Data Journalism and Misinformation, in: Tumber, H., Waisbord, S. (Eds.), The Routledge Companion to Media Disinformation and Populism. Routledge. https://doi.org/10.4324/9781003004431

Young, M.L., Hermida, A., Fulda, J., 2018. What Makes for Great Data Journalism? Journalism Practice 12, 115–135. https://doi.org/10.1080/17512786.2016.1270171

Zamith, R., 2019. Transparency, Interactivity, Diversity, and Information Provenance in Everyday Data Journalism. Digital Journalism 7, 470–489. https://doi.org/10.1080/21670811.2018.1554409

Zhu, L., Du, Y.R., 2018. Interdisciplinary learning in journalism: A Hong Kong study of data journalism education. Asia Pacific Media Educator 28, 16–37.

In- and Exclusion in Online Meetings

S. Reidl[1], J. Greithanner[1], S. Beranek[1], H. Schiffbänker[1], A. Schneider[2], D. Sellitsch[2], G. Regal[2], Monika Meirer[3], Jenny Schlager[3], Flavia Anzengruber-Tanase[4], Robert Hartmann[4]

[1]Institute POLICIES, Joanneum Research, Austria

[2]Center for Technology Experience, Austrian Institute for Technology, Austria

[3]Integrated Consulting Group, Austria

[4]Netural GmbH, Austria

Abstract: The climate crisis and COVID-19 restrictions have boosted online meetings. To promote sustainability, it is crucial to continue using this form of communication post-pandemic, reducing traffic and pollution. However, online meeting technologies must ensure inclusion and belonging. Virtual communication offers advantages, facilitating participation for people with limited mobility and encouraging shy individuals to engage. Yet, it can also worsen inequalities: women may be overlooked, collectivized cultures may communicate less openly, and language barriers may increase for non-native speakers. Age and education level also affect technology receptiveness. In the FEMtech project FairCom[35], we examined inclusion and exclusion in online meetings and sought to enhance their inclusivity through a user-centered approach. We selected diverse teams from work, education, and leisure contexts and observed their meetings. Through questionnaires and interviews with facilitators and team members, we explored usage patterns, exclusion mechanisms, challenges, and improvement wishes. Our findings on user needs and exclusion mechanisms confirm inequalities in online meetings. Women, TIN and younger participants find it difficult to engage in online meetings. Accordingly, speaking times are very unevenly distributed, with men and older people taking up significantly more space. This is reinforced by the moderation. Using a Laptop or PC instead of a mobile phone and activate the camera can support participation, but hardware equipment depends on economic resources. The results of the needs assessment were brought into co-creation workshops by means of personas and user-scenarios, which developed ideas for solutions on fair speaking time, non-verbal feedback to the moderator and visibility of diversity.

---

1 Introduction

Online meetings have become integral to professional and social interactions, providing convenience for collaboration, knowledge exchange, and networking. However, as these virtual spaces gain prominence, it is crucial to examine their inclusivity and potential for perpetuating exclusionary dynamics. Gender research highlights that online communication is not gender-neutral but influenced by social dynamics (Armentor-Cota, 2011; Herring and Stoerger, 2013). Gender and other inequality dimensions can act as exclusion factors in online formats, both through factors observed in analogue communication[36] and through online-specific mechanisms. Exclusion and disadvantage mechanisms refer to general (non-)participation in online communication, as well as to exclusions, e.g. during online meetings - to "access" and "accessibility" (Parreira do Amaral, Stauber and Barberis, 2015) to and of technology use.

While online meetings may appear to have fewer barriers, they do not necessarily reach a higher share of diverse groups, as privileged groups remain overrepresented (Einstein Levine *et al.*, 2021; Wang, Li and Di Wu, 2023). Gender and age strongly correlate with perceived technology competence and openness, potentially leading to avoidance strategies among certain user groups (Arellano, 2020; Hauk, Hüffmeier and Krumm, 2018; Laitinen and Valo, 2018; ÖIAT, 2014; Reidl *et al.*, 2020). Participation in online meetings can be unevenly distributed and vary based on demographic characteristics such as gender (Lewis, Sekaquaptewa and Meadows, 2019; Ruthotto *et al.*, 2020), but also age and hierarchy e.g. (Arellano 2020, Heath und Wensil 2019). Social anxiety and introversion also influence online participation, with introverts apparently being less shy in virtual environments (Hammick and Lee, 2014; Sanudin *et al.*, 2022). However, computer-mediated anxiety can hinder participation (Brown, Fuller and Vician, 2004; Fuller, Vician and Brown, 2016).

Increasing participant numbers and longer meeting durations negatively impact engagement in online meetings (Jakobsson and Brock, 2021). Exclusionary communication practices and microaggressions, such as interruptions, occur in both analogue and online communication, disproportionately affecting non-binary individuals and women, queer women, women with disabilities, and Black women (da Silva Figueiredo Medeiros Ribeiro, Karen, 2020; Mendelberg, Karpowitz and Oliphant, 2014; Thomas *et al.*, 2019). Women's contributions tend to be overlooked and undervalued in both offline and online communication, which seems to be amplified in an unstructured

---

[36] For example, in offline communications, women's speaking percentages are often overestimated, while men take up more speaking time (Cutler and Scott (1990); Brescoll (2011)). This might be reproduced or even amplified in online settings.

communication culture, which favors dominant speakers (Connley, 2020; Huynh, Lee and Schuldt, 2005; Wang, Li and Di Wu, 2023). Other exclusionary practices include the use of jargon, monologuing, debating and passive-aggressive behaviours (Arellano, 2020). Unfortunately, non-binary perspectives are often overlooked in technology development and online communication research (Scheuerman *et al.*, 2021; Spiel, Keyes and Barlas, 2019).

Inclusive practices in online meetings involve creating smaller groups, utilizing multiple communication channels, and providing more time for response and reduced social interpretation (Jakobsson and Brock, 2021; Lowenthal *et al.*, 2020; Luk, 2021; Nisa, Prameswari and Alawiyah, 2021; Zolyomi *et al.*, 2019). 'Zoom' fatigue, characterized by feeling drained after videoconferencing, seems to affect women more than men (Bailenson, 2021; Johns *et al.*, 2021; Nesher Shoshan and Wehrt, 2021; Shockley *et al.*, 2021). Women's seemingly stronger dissatisfaction with their appearance during video conferences may also play a role in gender differences (Castelli and Sarvary, 2021; Fauville *et al.*, 2021; McIntyre, Negra and O'Leary, 2021; Meyer, 2020; Oducado *et al.*, 2021; Ratan, Miller and Bailenson, 2021; Shockley *et al.*, 2021).

For individuals whose first language differs from the meeting language, communication is already challenging, and online communication can pose an additional barrier due to limited non-verbal cues, poor video and audio quality (Arellano, 2020; Hui, Milin and Divjak, 2021; Mori, 2020; Rini, Noorman and Nafisah, 2021; Sohn, 2018).

By investigating these complex interrelationships between different inequality dimensions (such as gender, age, language skills, education) and in-/exclusion in the context of online meetings, the FEMtech project FairCom[37] aims to contribute to a deeper understanding of the challenges and opportunities that arise in these digital environments. Through an examination of existing research and empirical evidence, we seek to identify key factors influencing inclusion and exclusion dynamics and offer technological and communicative solutions for cultivating more inclusive online meeting practices. Ultimately, this research endeavours to inform both scholars and practitioners in their quest to create virtual spaces that offer inclusive communication opportunities. To this end, this article first presents the methodology of our empirical study in the first half of the project, describes its results, and gives an outlook on how the results were used to develop ideas for solutions in a participatory process. Finally we show possible solutions that will be developed within the project and draw conclusions for researchers and practitioners in the field of online communication.

---

2 Methodology and Sample

In the FairCom project, inclusion and exclusion in online meetings was investigated using a multi-method approach. Observations, interviews and a quantitative online survey were conducted. For the investigation, seven teams from work and leisure contexts were recruited. During the acquisition process, care was taken to select teams/groups of 5-15 members in order to enable observation. Moreover, team members should cover as many diversity characteristics as possible. Thus, teams were sought that differed in terms of age, ethnicity/cultural background, educational background and gender in all its diversity.

>*Observations:* Based on a comprehensive literature review, an observation protocol was inductively developed that takes into account different indicators of inequality or exclusion mechanisms in online meetings identified in the literature (e.g. speaking time, interruptions, de-/activation of the video function, moderation techniques, etc.). In total, we observed 53 people in 9 meetings, of which 22 were perceived as men (42%) and 31 as women (58%). No one expressed themselves as trans, inter- or non-binary (TIN). 40% of the observed persons were estimated to be under 35 years old, also 40% between 36-50 years old and 17% older than 50 years. The meetings ranged in length from 50 minutes to 130 minutes. For each team, at least one meeting was observed by two people from the project team and recorded, if consent was given. After the observation, the facilitation of the meeting was reflected upon by the observers and the reflection was recorded in writing. For each recorded meeting, speaking time statistics were compiled based on the recordings. The collected data was analysed quantitatively, the reflection notes were analysed qualitatively.

>*Interviews:* Guided interviews were conducted with 16 selected team members and seven team facilitators, one person from an inter-organisational LGBTQIA group and three experts for moderation of online meeting on usage behaviour, meeting culture, personal experience, needs for change and requirements for online tools. Of the 24 interview partners (excl. the three experts), 17 people described themselves as female (including one trans woman), 7 people as male, and no one as gender diverse. The age distribution among the interview partners is very balanced. The interviews were conducted between April and June 2022. The guidelines were created on the basis of the project's literature research and adapted to the role of the person (team member/facilitator). The interviews were recorded, transcribed and analysed for content using MAXQDA.

The interview data were analysed using qualitative content analysis according to Mayring (2000). Patton (2002) describes this as the process of reducing a volume of qualitative material to core consistencies and meanings. For this process we used inductive categories identified in the literature review, but also deductive approaches and developed categories from the interview material.

>*Online survey:* Based on a comprehensive literature research and the expertise of the project team, a questionnaire was inductively developed and created in SoSci. The questionnaire was online from April to June 2022[38]. The questionnaire contained questions about the use of (individual features of) online communication tools, experiences with communication and moderation in these meetings, as well as demographic information. A link to the online questionnaire was sent to all team members, facilitators and some interest groups and associations of gender diverse, trans, inter or non-binary people. A total of 60 questionnaires were included in the analysis. Significantly more women (56%) took part in the survey, followed by 28% men and 17% people who identify as trans, inter or non-binary. The participants were relatively evenly distributed between 18 and 70 years of age. Most respondents were in the 36-50 age group (42%). The age group up to 35 years accounted for 30% and those over 50 years for 28%. Among the participants, 68% have a higher education degree, while 20% have completed an apprenticeship or high school degree. 12% have a compulsory school leaving certificate or no completed school education. 90% of the respondents speak German as their mother tongue, while 10% have another mother tongue. About 18% indicate that they are often perceived as non-Austrians because of their appearance or language. The questionnaire was analyzed taking into account various diversity dimensions (gender, age, migration background, education, visual and/or hearing impairment).[39]

The results of all three methods were synthesized in one report. The results presented in this report have been used for participatory co-creation workshops with users to collect ideas for technological and communication solutions for facilitators to promote equal online communication. This participatory process and initial ideas for solutions are described below. First, however, we want to show summary results of the needs assessment:

---

[38] The period was chosen so long because the observation dates had to be scheduled according to the teams' meeting dates.

[39] As the questionnaire does not contain any compulsory questions, the number of answers sent in varies depending on the question. It should also be emphasised that the survey is not representative.

3 Results from the needs assessment

The majority of respondents utilize online meetings primarily within a professional setting, with over half of the participants also employing them for leisure and family activities. Additionally, half of the respondents utilize online meetings for educational purposes. Among the various online communication tools, Zoom and Microsoft Teams dominate in terms of popularity. Cisco Webex, Skype, GoToMeeting, Discord, and Slack are only sporadically used by some individuals. When participating in online meetings, the most commonly utilized devices are laptops or PCs. Less than a third of the participants use a mobile phone, and only a small number rely on tablets. Notably, people of colour tend to predominantly use mobile phones for online meetings. In our sample, this is mainly due to their economic conditions; a PC or laptop is not available for financial reasons. In addition, only women of colour participate in meetings from the public space - here clearly different resources become visible - in many cases they have neither a PC nor their own room at their disposal.

Technical difficulties are a recurring theme and were frequently mentioned in the interviews. Respondents report connectivity and software issues, problems with their hardware, and operational issues such as accidental muting during online sessions.

Camera use plays a central role in visibility and participation in online meetings and is therefore a significant factor of inclusion. In the interviews, the importance of the activated camera is emphasised in order to read the facial expressions of other meeting participants and thus to be able to better interpret verbal messages. Accordingly, the online survey reveals a significantly high proportion of individuals who consistently keep their cameras on during online sessions.

Slightly less than half of the respondents indicate in the survey to have always activated the camera. Only around 5% of respondents (almost) never have their camera on all the time. Men were significantly more likely than women, trans-, inter- and non-binary-people to say that they have their camera on (almost) all the time. An above-average number of women and trans, inter or non-binary people almost always have their camera deactivated. In our observations, also people of colour had turned off their camera more often than other participants.
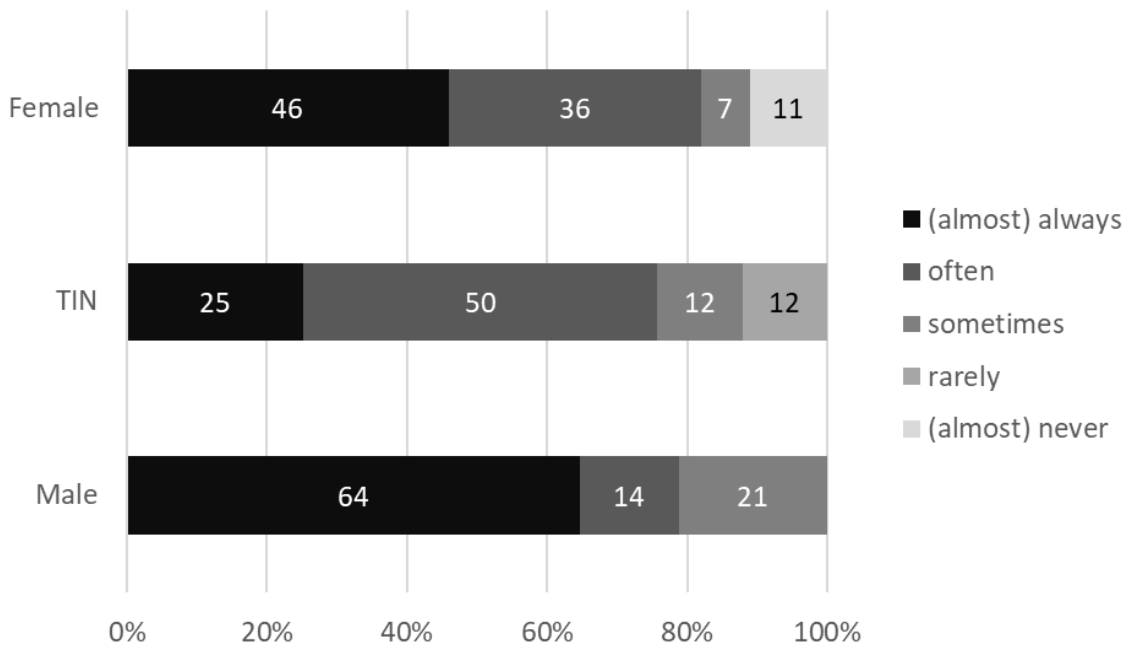
Figure 1: camera use by gender

If we look at camera use by age, we see that among participants under 35 years of age, less than a third have always activated the camera. By contrast, more than half of those aged 36 and over did so. People with a visual and/or hearing impairment (70%) have a much higher proportion of people who had (almost) always activated their camera.
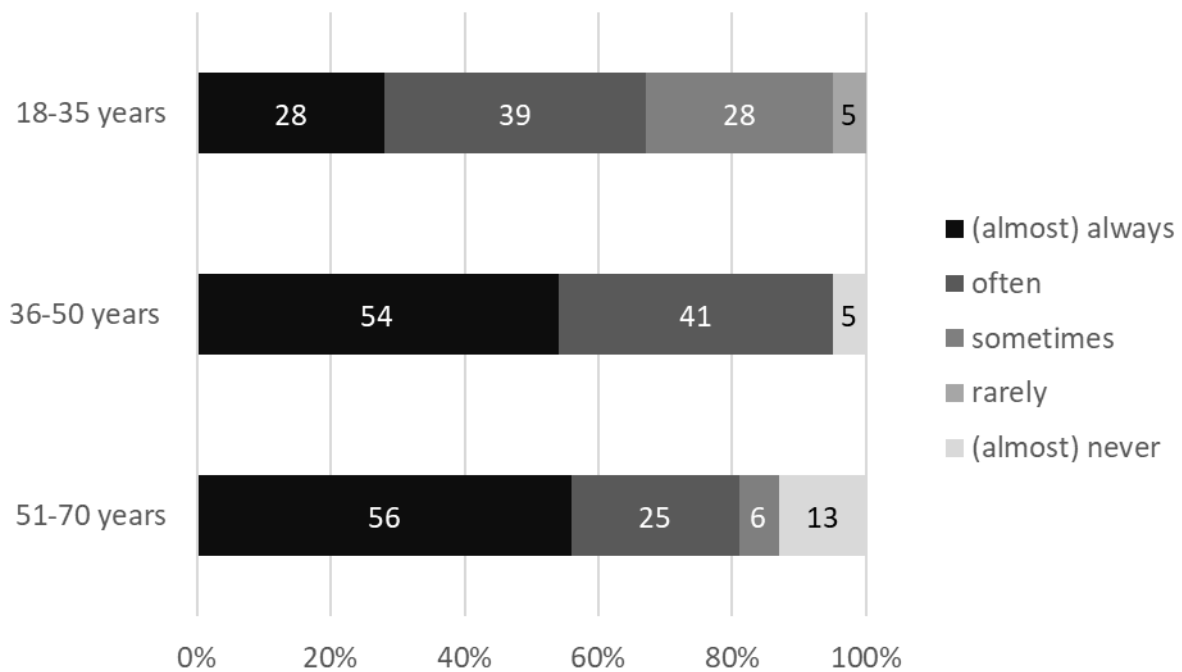
Figure 2: camera use by age

The most important reason for deactivating their camera is a poor internet connection. Not wanting to be seen, which is mainly frequently selected by trans-, inter- and non-binary-people, or to be able to do other things without being observed is also a reason for many to switch off the camera. If other participants in an online meeting have turned off their camera, this is a reason for around 46% to do the same. In the interviews, only women mention to turn off the camera because kids are around. Not wanting to see themselves is only a reason for 9% of respondents to turn off the camera. In the interviews, individuals mention that the self-view is exhausting or strange, only women are critical about their appearance in this respect.

If we take a closer look at the communication problems that participants face, we can see that the following situations are the most common ones that were mentioned in the survey and make online meetings difficult:

- Speaking at the same time (and then letting the others go first)

- Not getting a word in edgewise

- Being interrupted

- Voice is transmitted with a delay

- Long monologues by other people

- Being ignored and overlooked

With regard to the communicative challenges, we identify differences among the participants according to different diversity dimensions. Men report being interrupted more often in online meetings than trans-, inter- and non-binary-people and women – this contradicts the findings in the literature where women and non-binary people were found to be more interrupted than men. However, analysis of speaking time in the online meetings observed in this project shows that men have a significantly higher proportion of speaking time. More than half of the women had less than 5% speaking time, while this applied to only 20% of the men. It is therefore possible that men in our sample were more likely to be interrupted, because they were also more likely to speak. Moreover, the quantitative data of the observations shows, that men speak out more often than women and trans, inter- and non-binary people and the moderators reinforce this gender bias by inviting men to speak significantly more often than women and trans, inter- and non-binary people.

The following result could also be seen in this context. In the survey, women are more likely to say that other people in online meetings talk for an uncomfortably long time. Maybe, this is why women are also more likely than men to experience online meetings as tiring. Similarly, trans-, inter- and non-binary-people and women find it more difficult to speak up than men. In addition, women and trans-, inter- and non-binary-people more

often feel that less attention is paid to their words. None of the men expressed this experience, as figure 3 shows.

I often have the feeling that there is less attention paid to what I am saying.
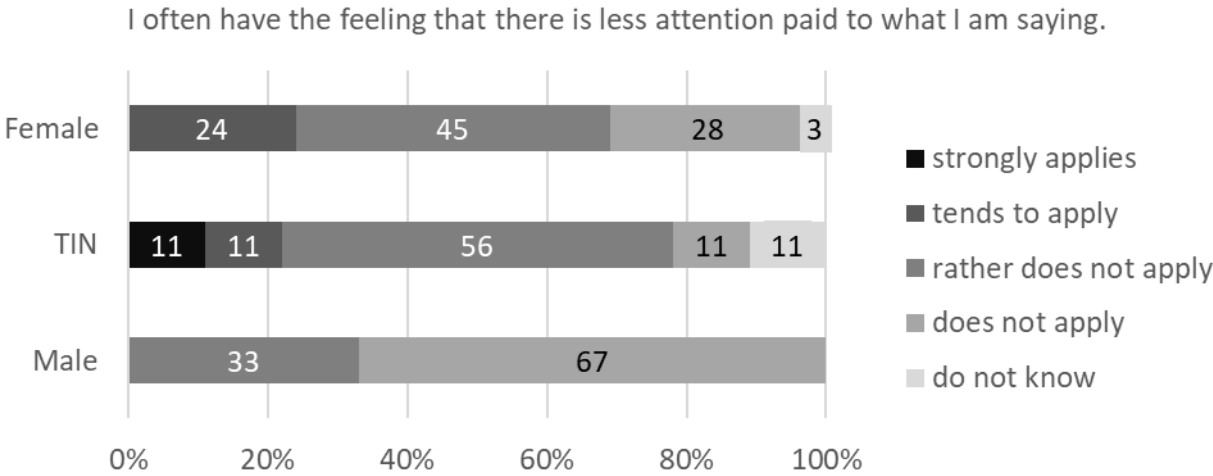
Figure 3: attention paid to their words by gender

For trans-, inter- and non-binary-people, further differences become clear: they are more likely to say they cannot get a word in edgewise and are more likely to be ignored/overlooked than male or female participants. Nevertheless, women and trans-, inter- and non-binary-people are slightly more likely than men to find it easier to speak online than in person.

Sexist comments are rarely observed by participants in online meetings, but most often by female participants. More than half of trans-, inter- and non-binary participants report that they are sometimes addressed by the wrong gender. In contrast, this has not happened to any of the male respondents and only very rarely to female respondents.

When analysing the experiences by age group, clear differences between the younger and the older participants become apparent in many areas. For example, it is more often the younger participants (under 36) who experience difficulty in speaking up and more often have the feeling of not getting a chance to speak. These experiences decrease with age. Only 25% of those over 50 sometimes feel they cannot get a word in edgewise (see figure 4).
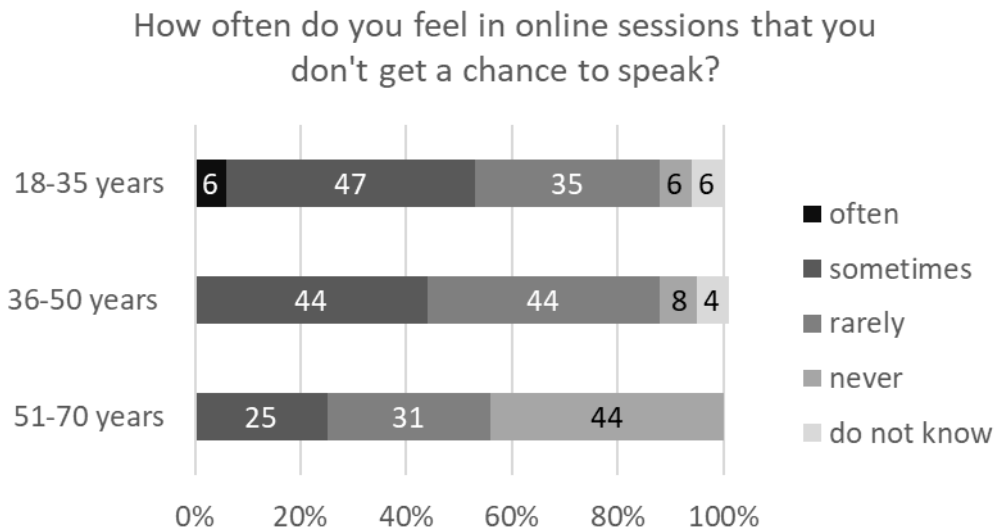
Figure 4: frequency of not getting a word in edgewise by age

Also younger people (44%) tend to have less of a say than others. Among the older respondents only 36% agree with this statement. The feeling of receiving less attention is also strongest among 18-35 year olds and decreases with age. The same goes for nervousness when speaking: Younger people are more likely to say they feel nervous before speaking. Even 22% of them strongly agree with this statement. With increasing age and therefore experience, nervousness decreases. This may also explain why chatting and emoticons are preferred to speaking, especially by some younger participants, as figure 5 shows. Only 13% of those over 50 prefer chatting and emoticons.
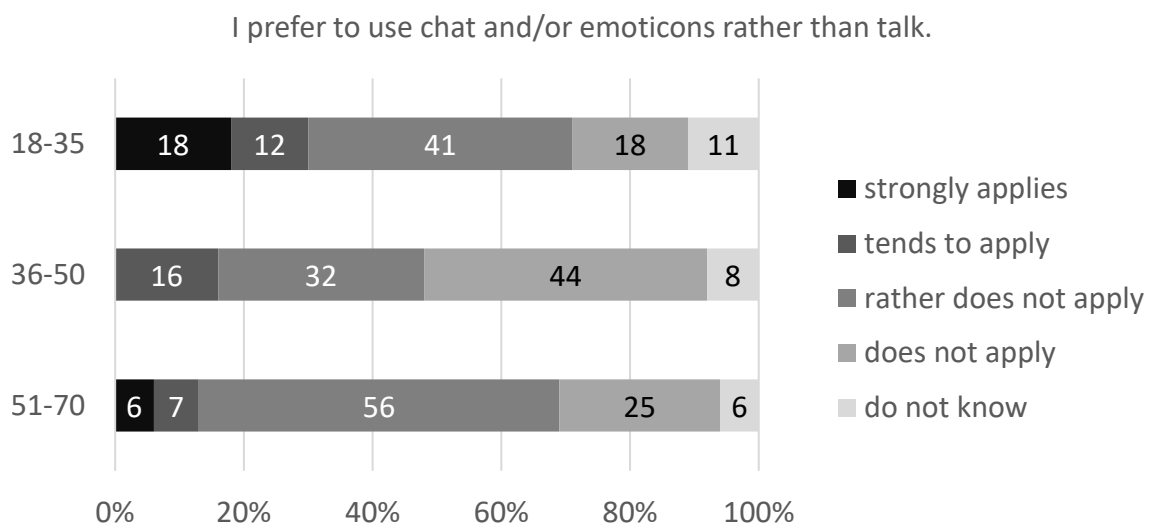
Figure 5: preference chat/emoticons over speak by age

Participants under 50 are more likely to be distracted and less able to concentrate than people over 50. This may be because they are less actively involved and find it difficult to get a word in edgewise. On the other hand, the disadvantages faced by older participants are associated with technological overload. This is especially a problem for those over 50, they are more often overwhelmed with dealing with technology. The interviews show that this is especially the case when other software, such as a whiteboard, has to be used in addition to video conferencing software.

4 Feeding results into co-creation – outlook on possible solutions

Based on the results of the previous needs assessment, personas and user stories were created, which served as input and starting point in the following co-creation activities and ensured a common understanding about the target groups and their needs in the project team. Special attention was paid to the diversity and gender dimensions and it was tried to avoid stereotypes. A total of six personas were created, which differ in the degree of their affinity for technology and extraversion, as Figure 6 shows:

Name of the Persona	Short description	Extraversion	Tech. Affinity
Maria Muth	Teaches online, often speaks into a black hole and monologues as a result, wants to address special needs of participants and knows the benefits of equal communication, but misses strategies to do so	high	low
Hermann Kiraly	Must attend telcos at work, is very stressed as a result, has difficulties in using, often turns off his camera	Low	low
Valentin Miller	Successful start-up CTO, likes to share, technology must be able to do everything and solves any problems	High	high
Tiam Ansarh	Language barrier, therefore prefers to use chat, afraid of making mistakes, is very structured and also wants structure in an online meeting	Low	high
Alex Mayer	Has to communicate a lot at work, but doesn't like telcos, feels misgendered and being discriminated against, wishes for more sensitivity, acceptance and tolerance in this context	Middle	middle
Darja Melnik	Uses telcos privately to communicate, participates with her cell phone, in a noisy environment, is often disturbed, always has her micro on	Middle	middle

Figure 6: description of personas

The project follows a strongly user-centered design process. In various co-creation activities, new technological ideas and interaction concepts for the interactive design of online meeting technologies and their implementation were developed together with users of different age, gender, ethnicity and professional background.

The co-creation activities included four ideation workshops, which differed in their composition and design. We started with experts who shed light on the different perspectives of inclusive online communication. Following three wokshops with a heterogenous group of users. Methods of gamestorming[40] and critical making (Ratto, 2011) were used.

In these workshops many ideas and interaction concepts were developed that address the described hurdles of the personas. The initial ideas of the users were clustered by a researcher in a preliminary stage and analysed and prioritized in a second stage by several researchers of the project team regarding their usefulness, technical requirements and innovation potential.

Thus, three main needs which potentially could be tackled using technology, could be identified:

1) A f**air distribution of speaking time** for all meeting participants is of particular importance for users. Regardless of their individual attributes and characteristics, speaking time should be allocated depending purely on their role during the meeting and on their concerns related to their tasks and context factors. The technology used should support this fair distribution of speaking time by, for example, visualizing this information about speaking time. However, how to distribute speaking time fairly is a difficult question that we will have to deal with in the further course of our research project, as it depends very much on the objective of the meeting and the tasks of the team members. In a participatory workshop, for example, it might make sense to distribute speaking time equally to give everyone the opportunity to contribute. In a project meeting, the project leader or individual task leaders may need more speaking time than others who are supposed to give feedback or ask questions.

2) All meeting participants should have opportunities to **provide non-verbal feedback** about how the meeting went, both during and after the meeting. In this way, the mood or certain misconduct, such as inappropriate jokes, discriminatory language, too long speaking time, etc. can be addressed.

3) Another important point in online meetings is **to make diversity visible**. The current technological solutions only include the possibility of displaying pronouns together with the name of the person participating. This issue should be addressed in a much more

---

[40] https://gamestorming.com/

comprehensive and far-reaching way. For example, profile frames or avatars would be a way to make diversity visible. We expect these aspects to be addressed with technology, but organisational measures and moderation techniques are also needed to support them.

The existing ideas and interaction concepts in these three categories of needs will be refined in the further process of the project and developed into prototypical solutions. An evaluation with users regarding the usefulness and acceptance of the ideas and concepts enables early feedback before the technical implementation starts.

Furthermore, the co-creation workshops and an additional workshop with facilitation experts identified some needs for improvement in online meeting facilitation. These needs can be addressed by developing online facilitation methods and guidelines that focus on the following:

1) By setting an agenda, meeting purpose, participant roles, etc., the facilitator can give each meeting a **design and structure** that makes it easier for participants to engage.
2) Facilitation should create inclusiveness, allowing active and **fair participation** of all participants. A variety of methods allows for the appropriate choice of processing form depending on the topic.
3) The results should be documented during the meeting and thus made visible. **Visualization** makes it easier to follow up in the meeting and promotes interaction through joint documentation.
4) The facilitator can actively **shape the rhythm** of the meeting. Different methods can hold attention, activate or promote a constructive discussion climate.

5 Discussion and Conclusion

Most results from the needs assessment conducted in FairCom confirm results from the literature review and therefore confirm the need of improvement on technological but also meeting facilitation level to make online communication more inclusive. In our needs assessment, as well as in Brescoll (2011), it can be seen that men and older participants have significantly longer speaking times than women, trans, inter or non-binary people and younger participants. Also, that women and non-binary individuals are much more affected by exclusionary communication practices like being overlooked (Thomas et al. 2019; Mendelberg et al. 2014; da Silva Figueiredo Medeiros Ribeiro 2020) confirm our findings. Moreover, we see in our results that women are undervalued in meetings more often, as also Connley (2020) and Heath and Flynn (2014) have shown in their research.

Our findings are also consistent with studies showing that women and trans, inter or non-binary people are more likely to deactivate cameras. However, the reasons we were able to identify for deactivating cameras are less likely to confirm that women do so primarily because they are uncomfortable with their appearance in videoconferences, as Fauville (2021), Oducado et al. (2021) and others show in their studies. Feeling uncomfortable seeing oneself only applies to a small group of women and trans-, inter- and non-binary persons. Bad internet-connection and side-activities are much more important reasons for turning off the camera. For people of colour, the hardware is also likely to play a role to turn off the camera - they are more likely to attend meetings via mobile phone. In any case, it becomes more difficult to engage in the meeting without a camera, as the non-verbal communication level is missing. The quality of participation therefore depends not only on gender and age (connected to hierarchy level[41]), but also on economic conditions.

A main finding of our analysis is the very uneven distribution of speaking time, favouring men against women, trans-, inter- and non-binary people and younger participants. This inequality is even increased by facilitators! This result shows how important training and awareness raising of moderators is to enable them to contribute to a more equal participation of team members in meetings. This result also encourages us to concentrate on the development of inclusive facilitation methods and guidelines for action in the further course of the FairCom project, in addition to further technical developments.

If we look at the solutions raised so far in the participatory co-creation process to combat inequalities in online meetings, it quickly becomes clear that organisational culture plays an essential role in the question of how technological and facilitative solutions are used to have an effect. Only those who, for example, attach importance to offering all team members equal opportunities to contribute to a meeting will use moderation methods and technical solutions in this regard. The development of non-verbal feedback possibilities for meeting facilitators will only make sense if this feedback is desired and leads to facilitators reflecting on and wanting to improve their actions.

With our research in FairCom, we were able to contribute findings from Austria to the research on online communication, which mainly comes from the USA. However, results could be different in other cultures, so more research from different regions of Europe and other continents would be desirable. Moreover, our results are based on a very small sample that is not representative. We only managed to include trans- inter and non-binary people in the online survey and not in the interviews and observations. The perspective

---

[41] The literature shows, that hierarchy level can be a significant factor for distribution of speaking time (see xy). We could not prove this with our teams as there were teams without hierarchy (teams in leisure context) and teams that were moderated by their superior, which already influenced the distribution of speaking time significantly.

of people of colour and people with disabilities could only be touched upon. The context of use of the teams involved often focuses on work. Online communication in associations, NGOs and interest groups could only be mapped to a very limited extent. In this respect, a more comprehensive quantitative and qualitative study would be interesting to validate, expand and deepen our results.

References

Arellano, E. (2020) Power Dynamics and Inclusion in Virtual Meetings. Available at: https://aspirationtech.org/blog/virtualmeetingpowerdynamics.

Armentor-Cota, J. (2011) 'Multiple Perspectives on the Influence of Gender in Online Interactions', Sociology Compass, 5(1), pp. 23–36. doi: 10.1111/j.1751-9020.2010.00341.x

Bailenson, J.N. (2021) 'Nonverbal overload: A theoretical argument for the causes of Zoom fatigue', Technology, Mind, and Behavior, 2(1) (16pp).
doi: 10.1037/tmb0000030

Brescoll, V.L. (2011) 'Who Takes the Floor and Why: Gender, Power, and Volubility in Organizations', Administrative Science Quarterly, 56(4). Available at: https://doi.org/10.1177/2F0001839212439994.

Brown, S.A., Fuller, R.M. and Vician, C.M. (2004) 'Who's afraid of the virtual world? Anxiety and Computer-Mediated Communication', Journal of the Association for Information Systems, 5(2), pp. 79–107.

Castelli, F.R. and Sarvary, M.A. (2021) 'Why students do not turn on their video cameras during online classes and an equitable and inclusive plan to encourage them to do so', Ecology and Evolution, 11(8), pp. 3565–3576.
doi: 10.1002/ece3.7123

Connley, C. (2020) '45% of women business leaders say it's difficult for women to speak up in virtual meetings.', 3 September. Available at: https://www.cnbc.com/2020/09/03/45percent-of-women-business-leaders-say-its-difficult-for-women-to-speak-up-in-virtual-meetings.html.

Cutler, A. and Scott, D.R. (1990) 'Speaker sex and perceived apportionment of talk', Applied Psycholinguistics, 11(3), pp. 253–272. doi: 10.1017/S0142716400008882

da Silva Figueiredo Medeiros Ribeiro, Karen (2020) 'A Gender Analysis of Interaction in Online Work Meeting Tools', IHC '20, October 26–30, 2020, Diamantina, Brazil.

Einstein Levine, K. et al. (2021) 'Zoom Does Not Reduce Unequal Participation: Evidence from Public Meeting Minutes', Under Review.

Fauville, G. et al. (2021) Nonverbal Mechanisms Predict Zoom Fatigue and Explain Why Women Experience Higher Levels than Men. Available at: http://dx.doi.org/10.2139/ssrn.3820035.

Fuller, R.M., Vician, C.M. and Brown, S.A. (2016) 'Longitudinal Effects of Computer-Mediated Communication Anxiety on Interaction in Virtual Teams', IEEE Transactions on Professional Communication, 59(3), pp. 166–185.
doi: 10.1109/TPC.2016.2583318

Hammick, J.K. and Lee, M.J. (2014) 'Do shy people feel less communication apprehension online? The effects of virtual reality on the relationship between personality characteristics and communication outcomes', Computers in Human Behavior, 33, pp. 302–310. doi: 10.1016/j.chb.2013.01.046

Hauk, N., Hüffmeier, J. and Krumm, S. (2018) 'Ready to be a Silver Surfer? A Meta-analysis on the Relationship Between Chronological Age and Technology Acceptance', Computers in Human Behavior, 84, pp. 304–319.
doi: 10.1016/j.chb.2018.01.020

Heath, Kathryn; Flynn, Jill (2014): Women, Find Your Voice. In: Harvard Business Review. Online verfügbar unter https://hbr.org/2014/06/women-find-your-voice.

Heath, Kathryn; Wensil, Brenda F. (2019): To Build an Inclusive Culture, Start with Inclusive Meetings. In: Harvard Business Review, 06.09.2019. Online verfügbar unter https://hbr.org/2019/09/to-build-an-inclusive-culture-start-with-inclusive-meetings.

Herring, S.C. and Stoerger, S. (2013) 'Gender and (A)nonymity in Computer-Mediated Communication', in Holmes, J., Meyerhoff, M. and Ehrlich, S. (eds.) Handbook of Language and Gender.

Hui, S., Milin, P. and Divjak, D. (2021) Native perception of non-native speech: Speaker accent mitigates penalization for language errors in non-native speech unless the listener is conscientious (UC Merced - Proceedings of the Annual Meeting of the Cognitive Science Society). Available at: https://escholarship.org/uc/item/54r77777.

Huynh, M.Q., Lee, J.-N. and Schuldt, B.A. (2005) 'The Insiders' Perspectives: A Focus Group Study on Gender Issues in a Computer-Supported Collaborative Learning Environment', Journal of Information Technology Education (4), pp. 237–255.

Jakobsson, I. and Brock, T. (2021) Energizing the "Zoom-bie" Experience: Understanding virtual meetings through the influence of speaking times on perceived meeting satisfaction. Master of Science Thesis. BI Norwegian Business School.

Johns, H. et al. (2021) '"Can you hear me now?" Video conference coping strategies and experience during COVID-19 and beyond', Work (Reading, Mass.), 70(3), pp. 723–732. doi: 10.3233/WOR-210279

Laitinen, K. and Valo, M. (2018) 'Meanings of communication technology in virtual team meetings: Framing technology-related interaction', International Journal of Human-Computer Studies, 111, pp. 12–22. doi: 10.1016/j.ijhcs.2017.10.012

Lewis, N.A., Sekaquaptewa, D. and Meadows, L.A. (2019) 'Modeling gender counter-stereotypic group behavior: A brief video intervention reduces participation gender gaps on STEM teams', Social Psychology of Education, 22(3), pp. 557–577. doi: 10.1007/s11218-019-09489-3

Lowenthal, P.R. et al. (2020) 'Thinking Beyond Zoom: Using Asynchronous Video to Maintain Connection and Engagement During the COVID-19 Pandemic', Journal of Technology and Teacher Education, 28(2), pp. 383–391.

Luk, A. (2021) Zoom 2.0: Designing a Video Conferencing Platform for Students with Social Anxiety at Wellesley College. Master's Thesis. Available at: https://repository.wellesley.edu/object/ir1600.

Mayring, Ph. (2000). Qualitative Inhaltsanalyse. Grundlagen und Techniken (7. Auflage, erste Auflage 1983). Weinheim: Deutscher Studien Verlag.

McIntyre, A.P., Negra, D. and O'Leary, E. (2021) 'Mediated immobility and fraught domesticity: Zoom fails and interruption videos in the Covid-19 pandemic', Feminist Media Studies, 100, pp. 1–20. doi: 10.1080/14680777.2021.1996425

Mendelberg, T., Karpowitz, C.F. and Oliphant, J.B. (2014) 'Gender Inequality in Deliberation: Unpacking the Black Box of Interaction', Perspectives on Politics, 12(1), pp. 18–44. doi: 10.1017/S1537592713003691

Meyer, Z. (2020) 'Do you show your face in Zoom meetings? Your gender may play a role', FastCompany, 23 June. Available at: https://www.fastcompany.com/90514033/do-you-show-your-face-in-zoom-meetings-your-gender-may-play-a-role.

Mori, A.S. (2020) 'Next-generation meetings must be diverse and inclusive', Nature Climate Change, 10(6), p. 481. doi: 10.1038/s41558-020-0795-z

Nesher Shoshan, H. and Wehrt, W. (2021) ‘Understanding "Zoom fatigue": A mixed‑method approach’, Applied Psychology, 38(5) (26pp). doi: 10.1111/apps.12360

Nisa, L.Z., Prameswari, T.N. and Alawiyah, Y.I. (2021) ‘The Effect of Using Small Group Discussions Through Zoom Breakout Room to Increase the Frequency of Individual Speaking Participation in the Speaking Courses’, Journal of Digital Learning and Education, 1(3), pp. 18–26. doi: 10.52562/jdle.v1i3.264

Oducado, R.M.F. et al. (2021) ‘Predictors of Videoconference Fatigue: Results from Undergraduate Nursing Students in the Philippines’, Asian Journal for Public Opinion Research, 9(4), pp. 310–330.

ÖIAT (2014) Maßnahmen für Senior/innen in der digitalen Welt. Available at: https://www.digitaleseniorinnen.at/fileadmin/redakteure/Downloads/studie_massnahmen_fuer_senorinnen_in_der_digitalen_welt.pdf.

Parreira do Amaral, M., Stauber, B. and Barberis, E. (2015) ‘Access to and Accessibility of Education Throughout the Educational Trajectories of Youth in Europe’, European Education, 47(1), pp. 1–10. doi: 10.1080/10564934.2015.1001251

Patton, M. Q. (2002). Qualitative Research & Evaluation Methods. 3rd edition. Sage Publications, Inc.

Ratan, R., Miller, D.B. and Bailenson, J.N. (2021) ‘Facial Appearance Dissatisfaction Explains Differences in Zoom Fatigue’, Cyberpsychology, Behavior and Social Networking (6pp). doi: 10.1089/cyber.2021.0112

Ratto, M. (2011) ‘Critical Making: Conceptual and Material Studies in Technology and Social Life’, The Information Society, 27(4), pp. 252–260. doi: 10.1080/01972243.2011.583819

Reidl, S. et al. (2020) DIGITALE UNGLEICHHEIT - Wie sie entsteht, was sie bewirkt … und was dagegen hilft. Available at: https://www.femtech.at/sites/default/files/pictures/Reidl%2C%20Streicher%2C%20Hock%2C%20Hausner%2C%20Waibel%2C%20G%C3%BCrtl%20%282020%29%20Studie_Digitale_Ungleichheit_barrierefrei_final.pdf.

Rini, R., Noorman, S.S. and Nafisah, N. (2021) ‘Zoom-Storytelling: An Activity to Reduce Students’ Speaking Anxiety’, Jurnal Penelitian Pendidikan, 21(2), pp. 112–121. doi: 10.17509/jpp.v21i2.36653

Ruthotto, I. et al. (2020) 'Lurking and participation in the virtual classroom: The effects of gender, race, and age among graduate students in computer science', Computers & Education, 151(3), p. 103854. doi: 10.1016/j.compedu.2020.103854

Sanudin, S.R. et al. (2022) 'The influence of extrovert and introvert personality types on the acceptance of virtual learning during the COVID-19 pandemic: A survey', F1000Research, 11, p. 87. doi: 10.12688/f1000research.73611.1

Scheuerman, M.K. et al. (2021) 'Revisiting Gendered Web Forms: An Evaluation of Gender Inputs with (Non-)Binary People', CHI'21.

Shockley, K.M. et al. (2021) 'The fatiguing effects of camera use in virtual meetings: A within-person field experiment', The Journal of Applied Psychology, 106(8), pp. 1137–1155. doi: 10.1037/apl0000948

Sohn, E. (2018) 'The future of the scientific conference', Nature, 564(7736), S80-S82. doi: 10.1038/d41586-018-07779-y

Spiel, K., Keyes, O. and Barlas, P. (2019) 'Patching Gender: Non-binary Utopias in HCI', CHI 2019, May 4-9, Glasgow, Scotland, UK.

Thomas, R. et al. (2019) Women in the Workplace 2019.

Wang, Z.(H.), Li, J. and Di Wu (2023) 'Mind the Gap: Gender Disparity in Online Learning Platform Interactions'. Available at: Available at SSRN: https://ssrn.com/abstract=4196195 or http://dx.doi.org/10.2139/ssrn.4196195.

Zolyomi, A. et al. (2019) 'Managing Stress: The Needs of Autistic Adults in Video Calling', Proc. ACM Hum.-Comput.Interact., 3(CSCW).

On the Importance of the Plaza: Political Participation of Young Skateboarders in a Digital Society

S. Sackl-Sharif[1] and M. Maric[2]

[1] University of Music and Performing Arts Graz, Austria

[2] Skateboarder and Filmmaker, Graz, Austria

Abstract. Since April 2014, a so-called skateboard trick ban has been in effect in Graz, Austria, which allows skateboarding but prohibits leaving the asphalt with tricks or jumps. As a reaction, an urban social movement formed to protest the ban. This paper examines the political participation of the skateboarding community and its allies in Graz, focusing on their hybrid protest actions in digital and public spaces. Using a participatory research approach, a skateboarder and a sociologist jointly discuss the diverse perspectives of skateboarders on political participation and the significance of social media for the protest. The (co-)researchers analysed the digital platforms of a skateboard club, online content from political parties, and media coverage of the skateboard trick ban. Besides, they conducted participant observations in public spaces and interviews with young skateboarders. The analyses indicate that in addition to active political participation in the form of protest actions, some skateboarders expressed their protest through inaction and ignored the skateboarding ban. Despite the threat of fines, they continued to skate on their plazas and developed strategies to avoid being detected by the police. Social media played a central role in connection with the local skateboard club. They were not only used for sharing information or networking with allies but also for political protests in a narrower sense, e.g., for organizing an online protest song contest.

1 Prologue

This paper results from a participatory research project in which skateboarder Miran (from his insider perspective) and sociologist Susanne (from her scholarly informed outsider perspective) jointly research and discuss the skateboard trick ban in Graz, Austria. Inspired by the ideas of participatory action research (Chevalier and Buckles, 2019), I, Susanne, tried to reconnect the academic knowledge production with the knowledge production of the skateboarding community to comprehensively understand the social reality of skateboarders and their daily challenges. In order not to hide the skateboarders' voices behind the academic analysis and reflection, we wrote this paper

together. In some sections, we refer separately to the perspective of the sociologist and the skateboarder to emphasize our diverse concepts and approaches. We start the paper with a brief introduction of ourselves and our access to the skateboard trick ban.

Miran: As a Graz 'local' who has been skateboarding since 2003 and documenting the scene as a filmmaker since 2014, I was shocked by the skateboard trick ban. Therefore, I began researching for a documentary film about the ban and its effects to communicate 'the importance of the plazas' to the city council. During my investigations, I got in touch with Susanne. We met at a public event she organized to discuss the skateboard trick ban.

Susanne: My position is that of an outsider since I am not a member of the skateboarding community. However, in my research I have been interested in public space and political participation for a long time. For instance, I did research on regulations of public spaces in Graz with sociology students (Malli and Sackl-Sharif, 2015) or on citizens' initiatives (Sackl-Sharif, 2018) that also play a role in the context of the skateboard trick ban. Therefore, the ban has attracted my attention from the beginning, and I scholarly accompanied it from March 2021 to May 2023.

2 Introduction

The skateboard community has been part of the city life in Graz for many years. It meets in skate parks, skate shops, or on the streets. In 2014, some skateboarders founded the local skateboard club *GRÄB – Grazer Rollbrett Ästheten Bund* to promote the sport and lifestyle of skateboarding (GRÄB, 2021a). Since the beginning of the Covid-19 pandemic, inner-city public spaces in Graz have been increasingly used by young skateboarders, as there were barely any other opportunities for sporting activities. As many people were working in home offices at the time, the pandemic made skateboarders more visible and audible than before. In some central places, especially at the Kaiser-Josef-Platz, this led to complaints from residents about noise pollution and littering. Therefore, the situation at Kaiser-Josef-Platz shows conflicts of use and sometimes opposing opinions. In addition, the Covid-19 restrictions may have helped to amplify existing tensions between different interest groups (Sackl-Sharif, 2022).

In March 2021, the right-wing populist party FPÖ took up and intensified the residents' dissatisfaction on a website with the title skaterlaerm.at[42] ('skaternoise'). Together with the complaint of a resident to the municipal penalties and enforcement office ('Referat für

---

[42] The website skaterlaerm.at is offline but can be accessed at the following link:
https://web.archive.org/web/20210506141635/https://skaterlaerm.at/.

Strafen und Vollstreckungen'), this FPÖ initiative led to a new interpretation of the Road Traffic Regulations ('Straßenverkehrsordnung') in April 2021. Since then, skateboarding has been allowed, but not leaving the grounds with jumps or tricks to maintain public safety. Those who did not comply with the ban had to expect a fine of 15 euros (Müller, 2021).

The skateboard trick ban provoked many protest actions. Parallel to demonstrations and art actions in public spaces (Sackl-Sharif, 2022), much of the mobilization of allies took place on social media platforms. The platforms of the skateboard club GRÄB played a central role in this regard, acting as a hub for the exchange and dissemination of information. In addition, some skateboarders did not organize themselves into groups and protested against the ban by simply ignoring it.

Against this background, we explore the political participation of the skateboarding community and its allies in Graz in this paper. We follow the definition of political participation by Verba, Schlozman, and Brady (1995: 38), who summarize political participation as "any activity that has the intent or effect of influencing government action – either directly by affecting the making or implementation of public policy or indirectly by influencing the selection of people who make those policies". Examples of such political participation in this broad understanding are citizens' initiatives and social movements that also play a role related to the skateboard trick ban. In this paper, we are especially interested in the question of what political participation can look like in a digital society (Lindgren, 2021). We use the term 'digital society' to describe the digital transformations of recent decades, which have led to social media increasingly becoming an integral part of social structures. We do not see digital transformations as merely technical but as "deeply politically charged processes embedded in broader social constellations" (Kannengießer and Kubitschko, 2017: 1). Therefore, the intertwined character of activism in digital and public spaces is relevant in this paper.

First, we will define public space and plaza, and we will describe our research design. Afterwards, we will summarize the most important events related to the skateboard trick ban in a chronology to make our results intersubjectively comprehensible. In the following two sections, we will present our findings related to the political participation of skateboarders in Graz. Finally, we will discuss the most relevant outcome of our joint research in a conclusion.

3 Definitions and theories

To provide a framework for better understanding the use conflicts around Kaiser-Josef-Platz, we will briefly outline our definitions of public space or skateboarders' plazas. First, Susanne will define public space from a scholarly perspective before Miran will describe the importance of the plaza from a skateboarder's point of view.

3.1 Susanne: Regulations of the public space from a scholarly perspective

I follow Henri Lefebvre's (1991) actor-centred theory of space, in which space is considered a product of social and historical practices that are part of social structures and power relations. Urban public spaces, in particular, are characterized by overlapping perspectives, uses, meanings, and interests of different actors (Massey, 1994). Therefore, in the discussion about public urban spaces, it is not only accessibility to them that is relevant. They should also enable and tolerate diversity, differences, and encounters (Schäfers, 2006). Public urban spaces in general – and plazas as a particular form – are simultaneously mirrors and producers of social, gendered, economic, and political power relations (Malli and Sackl-Sharif, 2015).

However, public urban spaces have been increasingly regulated based on the principles of economization, aestheticization, and privatization in the last three decades. Private economic interests and aesthetics are more and more oriented towards the ideal of shopping centres. They influence the shape of public urban spaces to create a safe and clean shopping atmosphere in the city centre (Reiners, Malli and Reckinger, 2006). It is common for private investors to determine what is possible and what is not in these regulated public spaces. It is common for homeless people, begging people, or young people to be displaced to keep inner-city consumer spaces free of disturbances such as noise pollution or littering (Malli and Sackl-Sharif, 2015). As a result, one-sided regulations can lead to a shortage of usage opportunities. Consequently, city residents can no longer exploit the potential of public space to facilitate encounters between different social groups and interests.

3.2 Miran: Regulations of the 'plaza' from a skateboarder's perspective

Almost 60 years after its invention in the 1950s, skateboarding became an Olympic sport. For the first time, the Tokyo 2020 Olympic Games featured two skateboarding disciplines, street and park skateboarding, which shows that skateboarding is not limited to skateparks (Worldskate, 2017). It is also a street sport since its origin, and skateboarders use empty public spaces to practice their sport and artistic tricks. Especially so-called 'plazas' – easily accessible and exciting urban public spaces – play an essential role in

the skateboarding culture. Because they offer different obstacles and atmospheres, plazas cannot entirely be replaced by (more or less) standardised skateparks.

Large cities such as Barcelona, Paris, and London recognized the value of integrating skateboarding into public life. They accomplished building new training facilities for skateboard athletes and implemented skateboarding opportunities in the design and architecture of public spaces. One of the most famous plazas is the MACBA in Barcelona. It is located opposite the Museu d'Art Contemporani in the neighbourhood of El Raval and attracts many (skateboarding) tourists (Garcerán, 2011).

From the perspective of skateboarders, regulations of the plazas are also necessary to avoid disturbing residents. But a complete ban on skateboard tricks is a step in the wrong direction and one that the skateboarding community is unlikely to accept.

4 Research design

4.1 Susanne: Particularities of participatory research

Besides being interested in doing research with the skateboard community, I, Susanne, was also motivated to reflect with skateboarders about their challenges and desired solutions for the skateboard trick ban.[43] Therefore, I decided to use the ideas of participatory action research (Chevalier and Buckles, 2019), an approach developed for the analysis of social problems and advancing solution strategies with people affected. Due to my outsider perspective, I needed to gain knowledge about the skateboard trick ban and the skateboarding community in Graz as a first step. Therefore, I did some media analysis, participant observations, and expert interviews (see 4.2). Based on my findings, I was able to make the second part of the case study participatory (see 4.3).

I started working with Miran in the summer of 2022. In contrast to non-participatory research, it was essential to provide him with decision-making power (Machin-Mastromatteo, 2012). Therefore, he decided which method was most appropriate to discuss our topics with other skateboarders and selected the interviewees himself. This approach required more planning time to equally pursue practice and scholarly goals as a sociologist and skateboarder (von Unger, 2014). Following the ethical principles of the

---

Centre for Social Justice and Community Action (2012), I aimed to create an environment of mutual respect to facilitate active learning from each other.

4.2 Part 1: Susanne's research activities

Between March 2021 and September 2022, I conducted a media analysis on three levels to gain knowledge about the skateboard trick ban. Since this analysis aims to provide an overview, I applied a summarizing qualitative content analysis (Mayring, 2021) and used the software MAXQDA22.

- To create a detailed chronology of the events and to identify the main actors and their positions, I carried out an analysis of the media coverage of the skateboard trick ban. I conducted this analysis by searching the APA-DeFacto database of the Austrian Press Agency using the search query 'skate* + Graz'. After reviewing the initial search results, I saved all articles that contained information on the skateboard trick ban. All in all, I analysed 118 articles from local, regional, national, and international media, providing a comprehensive survey of all articles published during the survey period.

- To explore the perspective of skateboarders, I analysed the online platforms of the skateboard club GRÄB because this club has the largest reach in Graz when it comes to skateboarding. In addition to 16 blog posts (GRÄB, 2023a), this analysis contained 22 Facebook posts (GRÄB, 2023b) and 24 Instagram posts (GRÄB, 2023c), including reactions, comments, shared videos, and photos. It encompasses a complete survey of all published content during the survey period.

- To gain a deeper understanding of the political actors' perspective, I analysed the online platforms of the parties that frequently spoke out in connection with the skateboard trick ban in the media. In the centre of these analyses were the web presences of the right-wing populist party FPÖ (FPÖ, 2021; Wir Grazer – TV, 2021), but I analysed also selected channels of the Greens Graz (Die Grünen, 2023) and the socio-democratic party SPÖ Graz (SPÖ, 2023) as these two parties joined the protests against the ban. In addition, I also studied the minutes of municipal council meetings with a focus on the skateboard trick ban (Gemeinderat, 2023).

I also did ethnographic research (Gobo and Molle, 2017) at demonstrations against the skateboard trick ban and Kaiser-Josef-Platz in 2021 and 2022. Furthermore, I conducted some expert interviews (Bogner, Littig and Menz, 2009): two with members of the skateboard club GRÄB for a better understanding of the activities on their digital platforms and one with a lawyer who is a specialist in public space regulations. In addition, I organized two public events to discuss the skateboard trick ban with the public in the summer of 2022. I met Miran at one of these events and have worked with him ever since.

4.3 Part 2: Miran's interviews

I conducted ten problem-centred interviews (Witzel and Reiter, 2012) between December 2022 and February 2023 to include the perspective of skateboarders who are not members of GRÄB. To collect different opinions and ideas, I used the maximal variation sampling strategy (Patton, 2015) and approached as diverse members of the skateboarding community as possible. The sample consisted of four female and six male skateboarders aged between 16 and 29 years, with an average age of 24.

At the beginning of the interviews, I provided a brief overview of the research project and introduced myself as a co-researcher. I also notified the interviewees about my partnership with Susanne, and they signed a consent form that was created in accordance with GPDR guidelines. The main part of the interviews lasted between 30 and 60 minutes and focused mainly on the following topics:

- History as a skateboarder: How did it all begin, and how has the story evolved until today?
- The digital self: What are the most important social media, apps, and websites you use daily? What do you like and dislike about them?
- Skateboard trick ban: How much does this affect your everyday life as a skateboarder? What has changed for you since the trick ban? What solution do you wish for?
- Political participation: What digital platforms do you use for political information or protests in general and related to the skateboard trick ban?

I conducted the interviews in German, and we translated the quotes used in this paper into English. We anonymised all interview partners and referred to them using abbreviations (IP1 to IP10) in this paper. We jointly analysed the transcripts and discussed our different perspectives. As every detail of the interviews is relevant to our research, we applied a structuring qualitative content analysis based on an inductive categorization (Kuckartz and Rädiker, 2021), and we used the software MAXQDA22.

5 Findings

5.1 Chronology of the events: On the initial situation on the 'Kaiser'

In March 2021, the skateboard club GRÄB published a blog post on their website regarding discussions with representatives from the City of Graz (GRÄB, 2021b). The city received complaints from residents and market stallholders about the presence of skateboarders on Kaiser-Josef-Platz. The market stallholders were annoyed because

skateboarders used their tables for their tricks, while residents found it too noisy, especially at night and on Sundays. The City of Graz will consider preventing skateboarding at the 'Kaiser' if it can prove the complaints. GRÄB has requested the skateboarding community to respect the quiet times and keep the place clean.

A few days later, the political party FPÖ launched the website skaterlaerm.at ('skaternoise'). They promoted it through their YouTube channel "Wir Grazer – TV" with a video titled "Stopp dem Skaterlärm" ('Stop the skater noise') (FPÖ, 2021). The video shows skateboarders performing tricks in public spaces, accompanied by dark music and the sounds of the skateboards. It also displays terms such as 'damage to property', 'danger to persons', 'littering' and 'noise' with corresponding scenes or images, such as empty alcohol bottles when 'littering' appears. The video ends with the slogan "Enough is enough!" followed by a reference to the website skaterlaerm.at. On the website, the FPÖ addresses the topics covered in the video, focusing on the noise pollution caused by the sound of skateboards as they pop.

Hence, Kaiser-Josef-Platz is a place where different interests and uses overlap, leading to conflicts. The term 'pollution' is used by political actors to refer to both littering and noise pollution. In addition, the argument of the endangerment of people by skateboarders also plays an important role, which leads to a reinterpretation of the Road Traffic Regulations in April 2021. Based on §88 of the Road Traffic Regulations, they argue that skateboarding on squares and pavements is prohibited if it endangers other people, and skateboard tricks are considered dangerous in this context. Therefore, it is now only allowed to ride skateboards without leaving the ground for jumps or tricks (Cetin, 2021; Michalek, 2021).

5.2 The formation of an urban social movement and its protests

Our media analysis and expert interviews indicate that the skateboard trick ban evoked activism and alliances around the skateboard club GRÄB. For a short period, it is possible to speak of an urban social movement (Lebuhn, 2008) as various actors from the fields of science, art, culture, sports, politics, and other social movements (such as Fridays for Future) collaborated and joined the protest of the skateboarders. Moreover, the skateboard community did not initiate all protest actions. Instead, other protesters used the skateboard trick ban to express frustration with the political agenda in general.

For many protestors, the ban on skateboarding was just one example of the commercialization of public spaces in Graz. Siegfried Nagl, the former mayor of Graz and member of the conservative party ÖVP, introduced numerous bans during his tenure from 2003 to 2021. These bans placed various restrictions on using, occupying, and appropriating inner-city spaces. Examples of such bans included a ban on alcohol

consumption in some inner-city areas, a ban on begging (later deemed unconstitutional), and new regulations on street music (Malli and Sackl-Sharif, 2015). In 2015, Siegfried Nagl also aimed to make Graz a quieter city (Sharif et al., 2015). These regulations share a common political agenda centred around the principles of economization and privatization. The City of Graz has displaced or banned individuals who cause disturbances and noise to ensure that the city centre remains attractive to consumers and tourists.

From the beginning, the skateboarders received a lot of declarations of solidarity. For example, the Institute for Movement Sciences, Sport, and Health at the University of Graz formulated an open letter condemning the ban on skateboarding in public spaces and the relocation of skateboarders to parks on the city's outskirts, which they described as an unfriendly policy towards youths (Wieser, 2021). Besides, the representatives of the association *< rotor > Zentrum für zeitgenössische Kunst* ('Centre for Contemporary Art') published a guest commentary in the Kleine Zeitung in May 2021, criticizing the commercialization of public spaces and the gradual reduction of areas where people can stay without having to buy anything (Lederer and Makovec, 2021). The skateboarding community acknowledged these expressions of solidarity and shared them on their digital platforms (e.g., GRÄB, 2021c).

The social movement also expressed its anger through several protest actions in the public space. For instance, an artist projected the slogan 'Skateboarding is not a crime' on some buildings in Graz, attracting a lot of attention (Michalek 2021). Furthermore, the association Move it Graz[44] and Fridays for Future organized the demonstration 'Platz für uns Menschen' ('Space for us people') in June 2021. These social movements respective citizens' initiatives invited the skateboard community to join them. The protest aimed to ensure equal access to public spaces for all residents (Move it, 2021). At this demonstration, the skateboarders arranged a skateboard contest accompanied by a concert to generate attention for their protest. GRÄB covered and promoted all these protest actions on their digital platforms to raise awareness about the skateboard trick ban.

In parallel, a large part of the protest and the mobilization of allies happened on social media. The digital platforms of GRÄB, such as Instagram, Facebook, and their blog, were central hubs for exchanging information. Journalists, in particular, noticed these platforms. On the one hand, the members of GRÄB received many interview requests from regional, national, and international media. On the other hand, many media institutions quoted directly from their digital platforms, especially from its blog. Despite having fewer subscribers or friends than other social movements in Graz, such as Fridays

---

[44] Move it Graz is a cross-party campaign of associations, companies and citizens who advocate for a socially just and ecologically sustainable mobility system in Graz.

for Future, GRÄB's Facebook and Instagram accounts have a significant reach given the size of the city and the specific interest in skateboarding. On Instagram, GRÄB has about 2000 subscribers, posts have been liked up to 1700 times and include up to 90 comments. On Facebook, they have about 1500 follower, posts have up to 300 reactions, and include up to 55 comments and 140 shares. The contents of the comments are relatively uniform: The commentators support the concerns of the skateboarders and share their outrage about the skateboard trick ban. Counter-opinions are hardly – if at all – present.

GRÄB utilized digital platforms not only for sharing information and exchanging ideas with their allies but also for organizing protest actions in a narrower sense. For instance, they collaborated with the music association Graz Connected to initiate the online protest song contest #skatenbleibt ('skating stays'). The contest received ten song submissions plus videos, each with a different musical style ranging from punk, death metal, and hip hop to singer-songwriter (GRÄB, 2021d). All lyrics are in German and include references to skateboarding tricks, point to political actors who are to blame for the ban, or to the ban's effects. For example, the winner Vuko Jebniac sang "Graz becomes a cemetery", and he concluded, "Politics comes and goes but skating stays". At the end of the contest, GRÄB and Graz Connected organized a concert with the winners in public space. Therefore, the online protest song contest is not only a prime example of the skateboarders' use of digital tools for their activism but also exemplifies the interconnectedness of protest in digital and public spaces.

5.3 Political participation of non-institutionalised skateboarders

Besides the members of GRÄB, an organized group of skateboarders that existed before the skateboard trick ban, many skateboarders in Graz do not belong to any association. To reach this group, Miran conducted his interviews. The interviews revealed that the skateboarders were disappointed with the ban on skateboarding tricks because there had already been agreements between skateboarders and residents regarding specific quiet hours prior to April 2021: "Of course, it totally disturbed me that this [= the ban] is suddenly the matter, although we had already agreed on the specific skate times before" (IP2). While many skateboarders were dissatisfied with the new plaza regulations, not all protested against the skateboard trick ban like GRÄB did. Instead, some chose to ignore the ban and continued to skate in public spaces despite the risk of being fined. As one interviewee stated, they preferred to skate in defiance of the ban rather than actively fighting against it:

> We kept going even during the pandemic. Of course, we didn't let ourselves be stopped by any laws passed by people who have no idea about our sport. [...] and we repeatedly had confrontations with the police, and it became unpleasant. Sometimes, the cops knew

us personally by name. And then they said: "Yes, if you come again, it is enough. Then we want you to pay a 100 euro fine." And we did not want to risk that. So, when they drove by, we just tried not to skate, hid the board very quickly, pretended we were drinking beer and having fun, just like everyone else there. (IP3)

On the one hand, skateboarders understood political protest in this context as not changing the typical skateboard actions. On the other hand, they developed new strategies to avoid drawing attention to themselves in public spaces. Some skateboarders preferred to move in groups with non-skateboarders who used the public space to meet with their friends. This practice made it more difficult for the police to identify them, creating a form of 'herd protection'.

These skateboarders rarely transferred their actions in public space to the digital space. Our analysis showed that the interviewed skateboarders are reflective – or even sceptical – social media users. They are annoyed by influencers and advertisements, especially if they are related to the skateboarding community. In the sense of digital detox, some interviewees deactivated or even deleted some of their social media accounts. Almost all interviewed skateboarders only stay online to be informed about events or important news. They use YouTube or Instagram to watch skateboard videos but barely actively produce content or interact with others. Therefore, it is not possible to generalize the interwoven character of GRÄB's protest in digital and public spaces to the whole skateboarding community of Graz.

In addition to the group of skateboarders who tried not to change their typical behaviour, some interviewees also observed that the ban had an effect and that fewer and fewer people skated in public spaces. Consequently, the individual skateboarder became more visible, as one interview partner noted:

> But you have already noticed that there were just fewer people compared to the situation before the skateboard trick ban. There was a larger community that used the plaza heavily, and that has diminished. [...] The ban may have deterred some people from entering the square, as they might have thought, "If I go there now, I'll just get a fine." There were only a few survivors left who didn't care about the consequences. (IP4)

For some, the presence of the police led to diminishing processes: "I was once at the Kaiser, and then the police came. I thought to myself, 'What should I do there?' I didn't really like being at Kaiser anyway. And when there is even more stress, I was no longer interested" (IP5). As a result, the skate parks became increasingly crowded, which some perceived as demotivating for skateboarding beginners:

> The only thing I noticed is that other skate parks were more crowded than before because there were hardly any public spaces available anymore, such as the Kaiser. They [= the skateboarders] had to go somewhere. [...] And then it was more exhausting to drive. I find that if you're a beginner, it's even more difficult. (IP7)

Besides, it was not only the ban in a narrower sense that contributed to the diminishing effects, but also the reactions from other citizens:

> Skating in public spaces was often uncomfortable. You would receive weird looks and comments from people passing by and snapping at you. And you ignored it and knew you were better than them. You don't have to respond to such things, but it was a challenging period [...]. They vented their frustration on you, and you were powerless to do anything about it. […] You noticed that many people are afraid of skating due to the negative stereotype associated with skateboarders. (IP3)

The skateboard trick ban illustrates the impact of the regulations in the public space also at a general level. It has changed the perception of all citizens, with some not accepting skateboarders anymore due to a lack of knowledge. They believed that skateboarding was generally prohibited and began attacking the skateboarding community. Some interviewees have stressed the importance of interacting with these citizens and convincing them that 'skateboarding is not a crime'.

6 Conclusions

The skateboard trick ban in Graz triggered the formation of an urban social movement, in which, in addition to the skateboard club GRÄB and skateboarders, actors from academia, art and culture, sports, politics, and social movements or civic initiatives participated. This social movement considered the skateboard trick ban a prime example of the commercialization of public spaces in Graz that had already manifested itself in similar regulations in the decades before. Using activism in digital and public spaces, the protesters spoke out against a policy of exclusion that uses rigid bans to push people out of the city centre. Furthermore, they demand easily accessible and non-consumer-oriented public spaces for all citizens.

The digital platforms of GRÄB were relevant hubs for sharing news, networking with allies, promoting declarations of solidarities and providing information for journalists. Since the digital platforms already existed, networking between skateboarders and other actors was possible relatively quickly after the discussions about a skateboard trick ban became public. Therefore, the emergence of a social movement was probably faster than it would have been in times before social media. Furthermore, the members of GRÄB tried to raise awareness for their protest and shape public opinion through hybrid activism in digital and public spaces, e.g., with an online protest song contest that was accompanied by a concert held in a public space. In a similar way as other social movements such as Fridays for Future (e.g., Boulianne, Lalancette and Ilkiw, 2020), GRÄB utilized the digital society's hybrid communication and protest possibilities to inform about their challenges, mobilize for their actions, and actively influence government action.

However, interviews with non-institutionalized skateboarders and our observations indicated that some skateboarders in Graz expressed their protest through inaction and had a different perspective on political participation. In the spirit of the saying 'skateboarding is not a crime', they remained in the public space and left the asphalt with jumps and tricks despite the ban. In contrast to the skateboard club GRÄB, they also did not integrate social media into their protest and stayed offline.

In this case study, the participatory research design contributed to tracing a manifold picture of the skateboarding community in Graz and exploring various understandings of political participation. In particular, access to non-institutionalized skateboarders would otherwise have been difficult, and the focus might have remained only on the skateboard club and its allies.

References

Bogner, A., Littig, B. and Menz, W. (2009) (eds) Interviewing experts. London: Palgrave Macmillan.

Boulianne, S., Lalancette, M. and Ilkiw, D. (2020) 'School strike 4 climate. Social media and the international youth protest on climate change', Media and Communication, 8:2, 208–218.

Centre for Social Justice and Community Action (2012) Community-based participatory research. A guide to ethical principles and practice. Durham: Durham University.

Cetin, T. (2021) 'Verbotsstadt 2.0. Skaten auf öffentlichen Plätzen verboten', Juridikum, 4, 424–427.

Chevalier, J. and Buckles, D. (2019) Participatory action research. Theory and methods for engaged inquiry. 2nd edition, Abingdon and New York: Routledge.

Die Grünen (2023) 'Die Grünen Graz', website, https://graz.gruene.at/ (Accessed 18 May 2023).

FPÖ (2021) 'skaterlaerm.at', website on web.archive.org, https://web.archive.org/web/20210506141635/https://skaterlaerm.at/ (Accessed 18 May 2023).

Gobo, G. and Molle, A. (2017) Doing ethnography. 2nd edition, London et al.: Sage.

GRÄB (2023a) 'GRÄB – Grazer Rollbrett Ästheten Bund', blog, https://gräb.at/ (Accessed 18 May 2023).

GRÄB (2023b) 'GRÄB', Facebook page, https://www.facebook.com/rollbrett.aestheten (Accessed 18 May 2023).

GRÄB (2023c) 'rollbrettaesthetenbund', Instagram account, https://www.instagram.com/rollbrettaesthetenbund/ (Accessed 18 May 2023).

GRÄB (2021a) 'Über GRÄB', GRÄB blog, http://gräb.at/beispiel-seite (Accessed 18 May 2023).

GRÄB (2021b) 'Kaiser-Josef-Platz: Kommt ein Skateverbot?', GRÄB blog, http://gräb.at/2021/03/kaiser-josef-platz-kommt-ein-skateverbot (Accessed 18 May 2023).

GRÄB (2021c) 'Sportwissenschaft: Grazer ForscherInnen fordern Ende des Skateverbots', Instagram, https://www.instagram.com/p/COzkM6RK8c_ (Accessed 18 May 2023).

GRÄB (2021d) 'Sound on! Das sind die Beiträge für den #skatenbleibt Protestsong-Contest im Überblick', Instagram, https://www.instagram.com/p/CRLqEIOK4Jj/ (Accessed 18 May 2023).

GRÄB (2021e) 'Einladung zur §88/2-'Sprung-Demo'. Alle Infos in der Organskateverfügung', Instagram, https://www.instagram.com/p/CTO_cpUqhCO/ (Accessed 18 May 2023).

Garcerán, D. (2011) 'MACBA', Barcelona skate spots blog, https://barcelonaskatespots.wordpress.com/2011/09/08/macba/ (Accessed 18 May 2023).

Gemeinderat (2023), 'Sitzungen, Tagesordnung, Archiv', City of Graz website, https://www.graz.at/cms/beitrag/10142612/7768104/Gemeinderat_Sitzungen_Tagesordnung_Archiv.html (Accessed 18 May 2023).

Kannengießer, S. and Kubitschko, S. (2017) 'Acting on media. Influencing, shaping and (re)configuring the fabric of everyday life', Media and Communication, 5:3, 1–4.

Kuckartz, U. and Rädiker, S. (2021) Qualitative content analysis. Methods, practice and software. London et al.: Sage.

Lebuhn, H. (2008) Stadt in Bewegung. Mikrokonflikte um den öffentlichen Raum in Berlin und Los Angeles. Münster: Springer.

Lederer, A. and Makovec, M. (2021) 'Die soziale Dimension des Skatens', Kleine Zeitung, 23 May, 41.

Lefebvre, H. (1991) The production of space. Oxford: Wiley-Blackwell.

Lindgren, S. (2021) Digital media and society. 2nd edition, London et al.: Sage.

Machin-Mastromatteo, J. D. (2012) 'Participatory action research in the age of social media: Literacies, affinity spaces and learning', New Library World, 113:11/12, 571–585.

Malli, G. and Sackl-Sharif, S. (2015) (eds) Im Schatten der Fassaden. Leben zwischen Verbot und Widerstand. Grazer Zwischenräume aus stadtsoziologischer Perspektive. Vienna: Lit Verlag.

Massey, D. (1994) Space, place, and gender. Minneapolis: University of Minnesota Press.

Mayring, P. (2021) Qualitative content analysis. A step-by-step guide. London et al.: Sage.

Michalek, E. (2021) 'Skateverbot: 'Wir lassen uns nicht verdrängen'', Annenpost blog, https://www.annenpost.at/2021/05/19/skateverbot-wir-lassen-uns-nicht-verdraengen (Accessed 18 May 2023).

Move it (2021) 'Kinder-Radparade am Aktionstag 'Platz für unsere Zukunft'. Zu Nutzungskonflikten im öffentlichen Raum', Move it blog, http://move-it-graz.at/wp-content/uploads/2021/06/PA_Kinder-Radparade_am_12.06.pdf (Accessed 18 May 2023).

Müller, W. (2021) 'Graz verhängt ein Skateverbot auf Plätzen', derstandard.at, https://www.derstandard.at/story/2000126420746/graz-verhaengt-ein-skateverbot-auf-plaetzen (Accessed 18 May 2023).

Patton, M. Q. (2015) Qualitative evaluation and research methods. 4th revised edition, London et al: Sage.

Reiners, D., Malli, G. and Reckinger, G. (2006) Bürgerschreck Punk. Lebenswelten einer unerwünschten Randgruppe. Vienna: Löcker.

Sackl-Sharif, S. (2022) 'Erschöpfte Räume? Über den 'Kampf' um öffentlichen Raum am Beispiel der Grazer Skater:innen', Kuckuck. Notizen zur Alltagskultur, 2, 30–33.

Sackl-Sharif, S. (2018) Das Thema (Erwerbs-)Arbeit in österreichischen Medien. Eine vergleichende Analyse ausgewählter Print- und Rundfunkmedien. Graz: Junge Industrie Steiermark.

Schäfers, B. (2006) Stadtsoziologie. Stadtentwicklung und Theorien – Grundlagen und Praxisfelder. Wiesbaden: VS Verlag für Sozialwissenschaften.

Sharif, M. et al. (2015) 'Straßenmusik in Graz, 2014. Ein explorativer Forschungsbericht', Jahrbuch des österreichischen Volksliedwerkes, 64, 119–130.

SPÖ (2023) 'SPÖ Graz – Die Stadtpartei', website, https://stmk.spoe.at/graz/ (Accessed 18 May 2023).

Verba, S., Schlozman, K. and Brady, H. (1995) Voice and equality. Civic voluntarism in American politics. Cambridge: Harvard University Press.

von Unger, H. (2014) Partizipative Forschung. Einführung in die Forschungspraxis. Wiesbaden: Springer VS.

Wieser, T. (2021) 'Grazer 'Skatetrick-Verbot', kleinezeitung.at, https://www.kleinezeitung.at/steiermark/graz/5980821/Grazer-SkatertrickVerbot_Polizei-erteilte-erste-Strafen-wegen (Accessed 18 May 2023).

Wir Grazer – TV (2021) 'Stopp dem Skaterlärm', YouTube, https://www.youtube.com/watch?v=chRAl2zDF_0 (Accessed 18 May 2023).

Witzel, A. and Reiter, H. (2012) The problem-centred interview. Principles and practices. London et al.: Sage.

Worldskate (2017) 'Skateboarding at the Olympic Games – Tokyo 2020', Worldskate, https://www.worldskate.org/skateboarding/news-skateboarding/1528-skateboarding-at-the-olympic-games-tokyo-2020.html (Accessed 18 May 2023).

Dynamic Topic Modeling of Video and Audio Contributions

A. Stöckl[1]

[1]Department Digital Media, University of Applied Sciences, Upper Austria

Abstract. This paper shows how topics and their temporal evolution in audio and video broadcasts can be analyzed and visualized automated. For this purpose, Deep Learning systems such as "OpenAI Whisper" and "GPT3" are used to transcribe the audio data and extract the essential content per broadcast. The "BERTopic" method (Grootendorst, M. 2022) is used for dynamic topic modeling. The result is clusters of content ("topics") that are described and visualized using scatter plots, word clouds, and line charts. The method solves problems of topic modeling and enables the automated analysis of large amounts of data. A software prototype was developed that combines the sub-models and enables the analysis. The method is demonstrated using the example of Austrian TV channel ServusTV's weekly commentary "Der Wegscheider" over a period of more than four years (2018-2022). It is shown that migration, "mainstream media," and the Covid-19 pandemic are dominant topics. The time trend analysis illustrates how the COVID-19 pandemic increasingly crowded out the other topics from mid-2019. This method demonstrates how AI can be applied to journalistic work to enable the analysis and visualization of large data sets.

1 Introduction

In our digitally connected world, vast information is expanding exponentially (Settembre, M. 2012). From social media platforms to online publications, blogs, and academic literature, textual data has become integral to our daily lives. However, making sense of this massive unstructured text has proven daunting (Masood et al., A. 2019). How can we efficiently analyze and extract meaningful information from this abundance of words?

Enter topic modeling – a powerful computational technique that enables us to discover hidden patterns, uncover thematic structures, and extract valuable insights from unstructured textual data. Topic modeling (Albalawi et al., 2020) has emerged as a transformative field within natural language processing (NLP) and machine learning, providing researchers, businesses, and organizations with a remarkable toolkit to make sense of vast text collections.

At its core, topic modeling is a statistical and machine-learning approach that aims to identify topics or themes within a given corpus of documents. Using sophisticated algorithms, topic modeling techniques can automatically group similar documents, identify key themes, and even uncover latent patterns that may not be immediately apparent to human readers. These extracted topics act as clusters of related words, which encapsulate the central ideas and concepts present within the text.

Topic modeling applications (Boyd-Graber et al., D. 2017) are extensive and span various industries and domains. In academia, researchers employ topic modeling to explore large document collections, identify research trends, and gain a comprehensive understanding of a specific research area. In business and marketing, topic modeling helps uncover customer sentiment, detect emerging trends, and analyze online reviews or social media conversations. Governments and policy-makers can leverage topic modeling to monitor public opinion (Ma, B. et al. 2016), analyze public debates, and make data-driven decisions.

This article shows how topics and their development can be automatically analyzed and visualized in audio and video contributions. These can be YouTube channels, podcasts, or recurring TV shows. Suppose the volume of posts is so large and spread over extended periods that it would only be possible to consume or analyze them with much effort. In that case, the automated solution presented can help to achieve results.

The programs usually address different topics, which also change over time. If you follow them for a more extended period, you have a particular impression that topics keep coming up, but often, this appearance is deceptive and does not match the facts. It is desirable to automatically process and analyze the content to make objective statements, often available in large volumes. Subsequently, derivations can be formed and presented by suitable information visualizations.

In this paper, we would like to show a procedure that enables a data journalist to effectively process this large amount of audio/video material and draw conclusions from it with a fully automated approach. In contrast to earlier work, we use current technologies to make the process as automated as possible.

2 Related Work

In this section, on the one hand, we give a brief overview of research works dealing with the analysis of video content for topic extraction. On the other hand, we refer to different ways of identifying topics in text documents available after the transcription step.

For information extraction for data journalists, different approaches are available that use Natural Language Processing (Wiedemann et al., 2018) or analyze multimedia data (Salvador et al., 2017) to enable partial automation of the analysis.

In Stappen, Baird, Cambria et al. (2021), a lexical knowledge-based extraction method based on "SenticNet" (Cambria, E. et al. 2010) was used to analyze the video transcriptions of the "MuSe-CAR" dataset (Stappen et al., 2021). The "MuSe-CAR" dataset is a large multimodal dataset that contains video, audio, and text. It was developed specifically for researching multimodal sentiment analysis to understand it better. A concrete application example for multimodal sentiment analysis is emotional engagement in product reviews, such as automobile reviews. Here, a specific sentiment is linked to a particular topic or entity. Analyzing the video transcripts of the "MuSe-CAR" dataset, meaningful information can be obtained about the emotional engagement and sentimental connection in such reviews.

The method of lexical knowledge-based extraction is based on "SenticNet," (Cambria, E. et al. 2010) a knowledge resource that provides an extensive collection of terms, emotions, and concepts with corresponding sentiments. By matching the video transcripts with "SenticNet," the terms they contain and their sentimental meaning can be extracted. This allows for a more in-depth analysis of emotional engagement and sentimental connections in the ratings of the "MuSe-CAR" dataset.

In Raaijmakers, den Hartog, and Baan, J. (2002), a model for multimodal topic segmentation and classification was developed using Dutch news videos as an example. The focus was on investigating the interaction between three modalities - visual, auditory, and textual information - within an integrated model for video analysis. The presented model is based on a fully automated sequential approach, where linguistic analysis and visual information are equally used for segmentation and classification. By combining linguistic analysis and visual information, the model allows for a more comprehensive and accurate analysis of news videos. It allows the identification and categorization of different topics and content in the videos by considering both the linguistic elements and the visual features.

In Zhu, Shyu, and Wang, H. (2013), a content-based video recommendation system called Video Topic is proposed, which utilizes a topic model in the context of recommendation systems. Its objective is to capture user interest in videos by employing a topic model to represent them and then generating recommendations by finding the videos that best align with the topic distribution of user interests. The Video Topic system introduces a novel approach to address the challenges of video recommendation by leveraging videos' inherent structure and content. Unlike traditional collaborative filtering techniques relying on user-item interactions, Video Topic focuses on the content. Using a topic model, the system can extract latent topics from videos, enabling a more profound

understanding of their content. Video Topic presents an innovative content-based recommendation system that employs a topic model to capture user interest in videos. By utilizing the thematic composition of videos and matching it with user preferences, the system generates personalized recommendations, aiming to enhance the relevance and satisfaction of users in their video consumption. The method is demonstrated and validated on the Movie Lens dataset[45] (Harper and Konstan, 2015).

For topic modeling of text content after transcription, several approaches are available, of which the "LDA method" (Blei, Ng, and Jordan 2003) can be considered the classical method, which, together with the visualization from Sievert and Shirley (2014), set the standard for a long time. The main limitation of the method is that it is based on a "Bag of Words" representation of the text contents. These consider the frequency of words in a document without regard to the order in which the words appear and thus cannot adequately capture the meaning of the documents.

With the advent of "word embeddings" such as "Word2Vec" (Mikolov et al., 2013) and "Glove" (Pennington et al. 2014), a more potent form of representing words in the form of high-dimensional vectors was available. Further developments also brought representations of entire text documents (Le and Mikolov 2014). These form a starting point for recent methods for topic modeling, such as "Top2Vec" (Angelov, 2020) and "BERTopic" (Grootendorst 2022), which are based on the representations of Devlin et al. (2018). We will use BERTopic in our method, representing state-of-the-art technology for topic modelling.

The detection of trends by Topic Modeling with "Top2Vec" over time was analyzed in Krauss, Aschauer, and Stöckl, A. (2022) using the Top2Vec method, and appropriate visualizations were given. Hall, Jurafsky, and Manning (2008) use topic modeling to analyze the history of ideas in computational linguistics, each based on text documents. An overview of different topic modeling techniques is given by Vayansky and Kumar (2020).

4 The Method and the Data

To demonstrate the method, it was necessary to find a suitable use case that is typical for the task and for which we have the data. We chose the series "Der Wegscheider"[46] of the Austrian TV channel "ServusTV", which provides weekly commentaries on topics from politics and society.

---

[45] https://grouplens.org/datasets/movielens/

[46] https://www.servustv.com/aktuelles/b/der-wegscheider/aa-1q66uk71n1w11/

ServusTV played a controversial role during the COVID-19 pandemic. The channel was criticized for disseminating partly false information about the pandemic[47]. Some of this information questioned the virus's dangerousness and the vaccines' effectiveness. For example, Corona down player Sucharit Bhakdi was regularly invited as a guest[48], and station chief Ferdinand Wegscheider disseminated questionable information in his weekly commentaries, such as claims that the Corona vaccine was a poorly tested, genetically modified substance or that the deworming agent ivermectin was successfully used against Covid-19[49].

ServusTV's role was particularly highlighted in the anti-Corona measures demonstrations in Vienna. Many demonstrators who protested against the measures and considered the vaccines dangerous obtained their information from ServusTV or the Telegram platform.

These practices led to controversy and criticism. For example, the Viennese press club Concordia filed a complaint with the media authority KommAustria[50], arguing that the station was not fulfilling its duty of journalistic care. It should be noted. However, the station boss, Wegscheider, defines his show as commentary and personal opinion, not reporting.

"Der Wegscheider" has been broadcast since 2018 at prime time on Saturdays at 19:30, and also reaches many viewers and listeners via social media and the podcast, making a not inconsiderable contribution to shaping opinion in Austria. To demonstrate our method, the series is well suited because this period of about four years has produced an immense amount of audio/video material, which is no longer easy to overview without technical tools.

In the following, we show, based on the presented method, which topics the broadcaster has covered and how these have changed over time. We needed the transcribed texts of the podcast versions available across different platforms to perform the analysis. In the analyzed period from November 3, 2018, to December 3, 2022, 161 broadcasts were available to us. The length of each broadcast varied between 6 and 8 minutes, resulting in about 19 hours of material.

---

[47]https://www.tagesschau.de/ausland/europa/servus-tv-corona-101.html

[48]https://www.servustv.com/aktuelles/a/corona-nur-fehlalarm-talk-spezial-mit-prof-dr-sucharit-bhakdi/118407/

[49]https://www.rnd.de/medien/servus-tv-verschwoerungserzaehlungen-und-tierdokus-WNRQT64KDND7VNPQ7XLWQ4CYYI.html

[50]https://www.rtr.at/medien/wer_wir_sind/KommAustria/KommAustria.de.html

To perform a topic analysis, the content must be in text form. Manual transcription would be both time-consuming and tedious for humans. Therefore, we need a mechanical method to create the transcriptions. This also allows us to scale to even larger data sets than the example shown.

A machine learning process for transcribing audio content can be implemented using speech recognition technologies. Such technologies use complex algorithms to convert spoken language into written text. Several commercial vendors and open-source solutions based on machine learning enable automated transcription.

When using a machine transcription process, it is essential to note that the accuracy of the result depends on several factors. The quality of the audio recording, the speakers' voice quality, background noise, and the transcription service used can all affect accuracy. The manual post-processing of the transcripts may be required to correct errors and improve quality.

After the transcriptions have been created, the texts are ready for further analysis. Natural Language Processing (NLP) methods can perform various analyses, such as extracting keywords, classifying topics, or detecting moods and emotions. These analyses can provide valuable insights into the podcast content and contribute to developing insights.

A recent paper (Radford et al., 2022) presented a new method, including open-source software, that produces a meager error rate comparable to human transcription. The model "OpenAI Whisper" is a robust multilingual speech recognizer consisting of a neural network according to the Transformer architecture (Vaswani et al., 2017) trained on 680,000 hours of audio. We use the "large" version, which promises the most accurate results but requires powerful hardware with GPU support to obtain usable transcription times.

This provides us with 161 text files with an average length of 7002 characters (maximum, 8466 and minimum, 5298). Together with the broadcast date, these form the basis for dynamic topic modeling over time.

5 Analysis and Results

Another problem in topic modeling is the correct setting of the hyperparameters that influence the model's performance. The choice of the number of topics is of particular importance. Too few topics can lead to missing essential topics, while too many can lead to overlap and ambiguity.

Various evaluation metrics can be used to improve the quality of Topics, such as the coherence score. This score evaluates the coherence of the words within a topic and allows the selection of the topics with the highest coherence values.

Another challenge is to consider the context and semantics of words. Often, words can have different meanings depending on the context in which they are used. Here, contextual word vectors, such as those used in BERT (Devlin et al. 2018), can help better capture the meaning of words.

Furthermore, the visualization of the topics is essential to make the results interpretable and understandable. In addition to the information visualizations already mentioned, word clouds or heat maps can show the most important words or the distribution of words in the topics.

Overall, topic modeling is a complex process that requires careful data preparation and an accurate selection of methods. It is essential to consider the specifics of the use case and make iterative improvements to obtain meaningful and interpretable Topics.

Here, we use the large language models that have recently become fashionable to extract the most important keywords from the individual transcripts, allowing us to obtain more interpretable topics. Current representatives of this genre are "GPT-3" (Brown et al., 2020), "Palm" (Chowdhery et al. 2022), and "Lambda" (Thoppilan et al., 2022). The training of these generative language models is that they are optimized for predicting the next word in an existing text corpus. We use the GPT3 language model with 175 billion parameters ("davinci-003") for our analysis[51], publicly available via a paid API. It has the advantage over the other representatives of being available in a better-optimized version by being enhanced with additional steps consisting of supervised learning and reinforcement learning (Ouyang et al., 2022).

This then provides a list of key terms for a transcript, such as in the example below:

Wegscheider, Delta-Mutation, Impfkampagne, Kündigungen, Abschiebestopp, Dolm der Woche, Nationales Impfgremium, Hans Maher, Zwangsmaßnahme, 3G-Regel, Testpflicht, Wiener Gemeinde-Wohnung, Afghane, Vergewaltigung, Ermordung, ORF-Reporter, Bundesregierung, Virologen, WHO, Birgit Hebein, Asylaktivisten, Abschiebung, SPÖ-Parteitag, Pamela Rendi-Wagner, Alma Zadic, Grünen

Translated to English:

Wegscheider, Delta Mutation, Vaccination Campaign, Terminations, Deportation Stop, Dolm of the Week, National Vaccination Panel, Hans Maher, Coercive Measure, 3G Rule, Mandatory Testing, Vienna Municipal Apartment, Afghan, Rape, Murder, ORF Reporter,

---

[51] https://beta.openai.com/docs/models/gpt-3

Federal Government, Virologists, WHO, Birgit Hebein, Asylum Activists, Deportation, SPÖ Party Conference, Pamela Rendi-Wagner, Alma Zadic, Greens

This representation is then subjected to a cleaning process that normalizes all words to lower case and removes numbers and special characters. This gives us short descriptions per transcript, as in the example:

delta mutation impfkampagne kündigungen abschiebelstopp dolm woche nationales impfgremium hans maher zwangsmaßnahme 3g regel testpflicht wiener gemeinde wohnung afghane vergewaltigung ermordung orf reporter bundesregierung virologen who selbsttests ferien gewalttäter asylwerber autobahnblockade birgit hebein asylaktivisten

Translated to English:

delta mutation vaccination campaign announcements deportation stop dolm week national vaccination board hans maher coercive measure 3g rule mandatory testing vienna community apartment afghans rape murder orf reporter federal government virologists who self-tests vacations violence perpetrators asylum seekers highway blockade birgit hebein asylum activists

With the 161 short descriptions, we now start topic modeling with BERTopic, which yields three topics, shown in **Fig 1**. For the 2-dimensional representation, the document vectors were dimensionally reduced using the UMAP method (McInnes, Healy and Melville 2018).

UMAP is a dimensionality reduction technique commonly used for visualizing high-dimensional data in lower-dimensional spaces while preserving the underlying structure. It is beneficial for visualizing word vectors, typically represented in high-dimensional spaces.

There are three topics named with the essential terms per topic.

0 - corona_impfpflicht_maskenpflicht - corona_vaccination_mask_obligation

1 - spö_medien_mainstream - spö_media_mainstream

2 - flüchtlinge_türkis_türkei - refugees_turquoise_turkey

The entire weekly comments of the four years can be traced back to this very narrow range of topics. In addition to the COVID-19 issue and the measures, the refugee issue and the mainstream media are dominant.

Documents and Topics
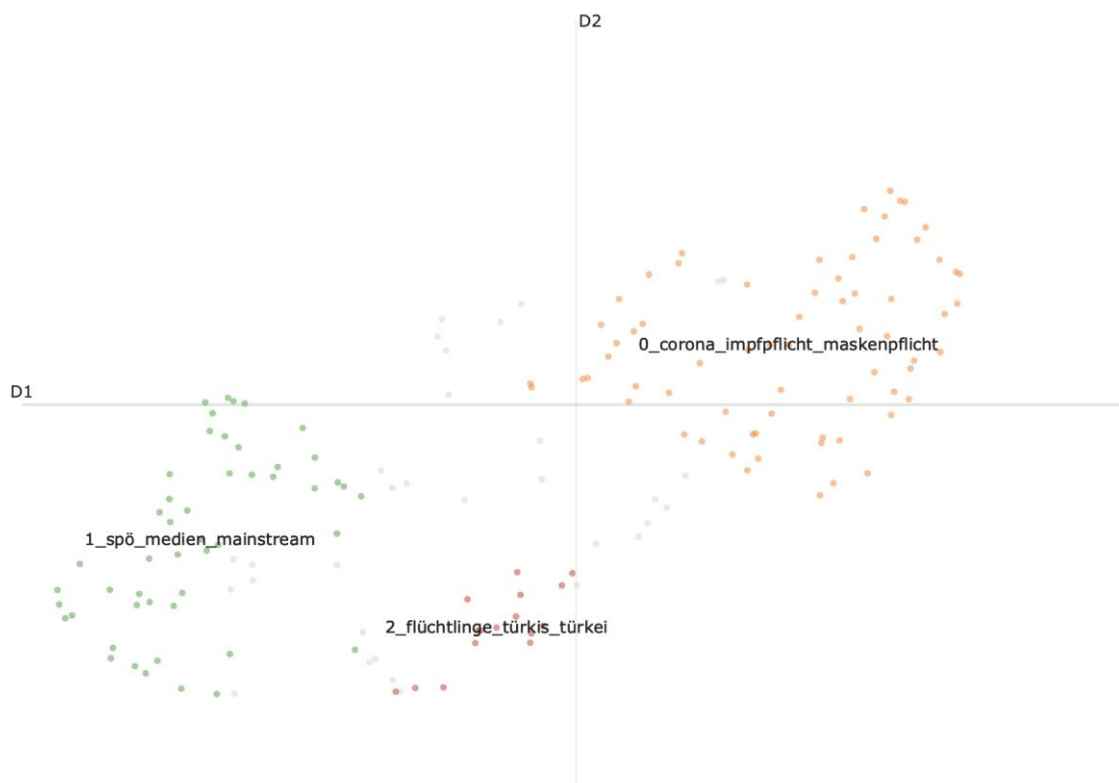
Figure 1: 2D display of transcripts and topic designation.

Word clouds, also known as tag clouds or text clouds, are visual representations of text data where words are displayed in different sizes, with more prominent or more extensive words indicating their higher frequency or importance within the text. They provide a quick and intuitive way to analyze and visualize textual information. In **Fig. 2**, we represent each topic as a word cloud, where the topic's importance weights the words' size. This makes it easier to identify the contents of the individual topics.

Topic 0 deals with compulsory vaccination, lockdown, and mandatory masking, which Wegscheider describes as coercive measures. From Wegscheider's point of view, these are driven by the pharmaceutical industry and mainstream media and represent violations of fundamental rights.

Topic 1 is devoted to the so-called mainstream media, such as the Austrian Broadcasting Corporation (ORF), which is always harshly criticized by Wegscheider and is accused of being close to political parties (SPÖ, FPÖ) and individuals (Kurz, Rendi-Wagner).

Topic: 0
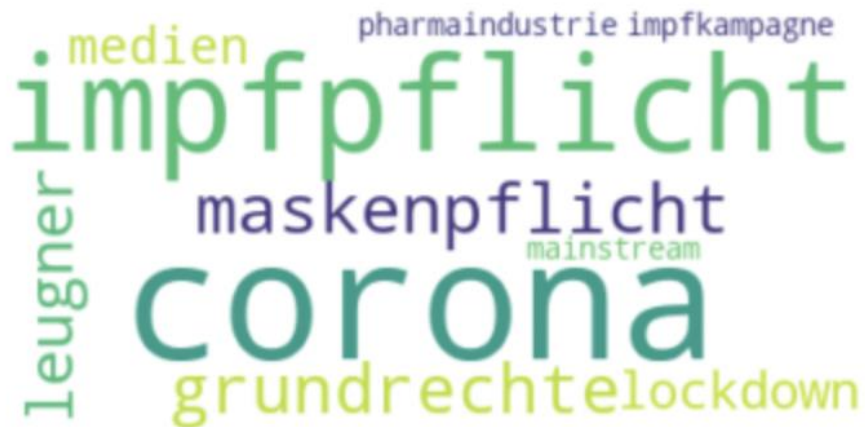
Topic: 1

Topic: 2
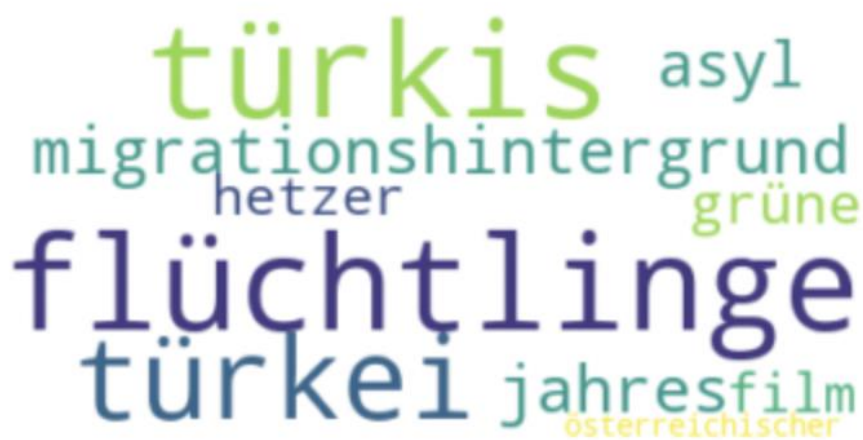
Figure 2: Word cloud for the three topics of "Der Wegscheider".

Topic 2 deals with the refugee problem and the topic of asylum together with the political parties ÖVP, associated with the color turquoise, and the Green Party. Wegscheider is a representative of a restrictive policy here.

Next, we examine the temporal course of the topics. How often are the topics represented in each week's comments?

Fig. 3 shows the development over time. It is clear how the COVID-19 topic emerges and pushes the other two topics back.
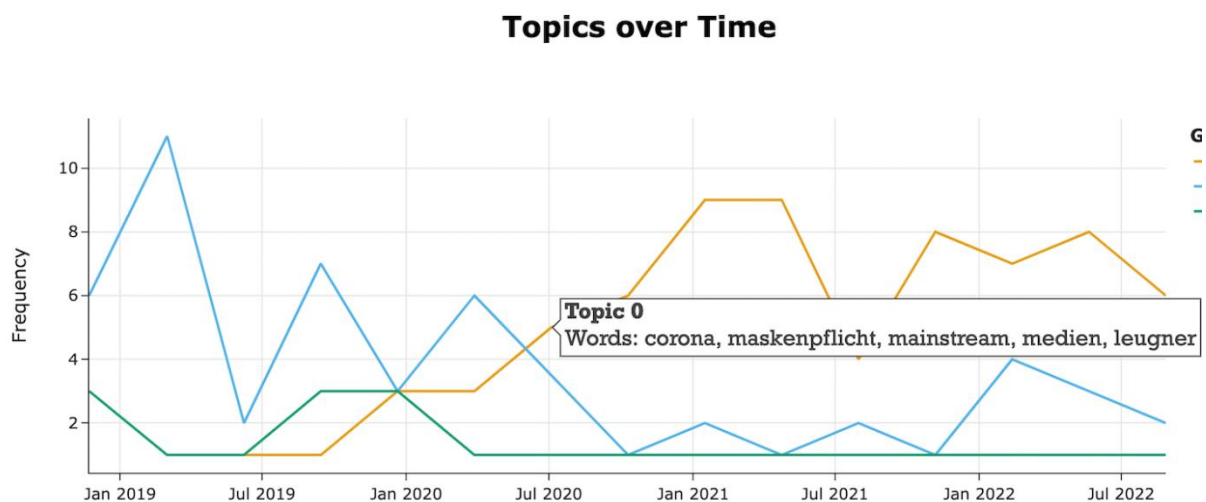
Figure 3: Line plot showing the development of the topics appearing in the broadcasts over time.

6 Summary and Outlook

In our example of the weekly commentary "Der Weigscheider," we have shown how a series of audio or video contributions can be subjected to automated topical analysis. In doing so, we used several powerful tools, including the transcription model "OpenAI Whisper," information summarization using "GPT3", and dynamic topic analysis using "BERTopic." The results were also processed using information visualization to enable better interpretation.

In the context of our concrete use case, we could determine the narrow thematic orientation of the "Der Wegscheider" and which topics predominate with him. In particular, it was interesting to observe how the topic of COVID-19 enormously gained importance over time and ultimately dominated.

This methodology can be applied to audio and video sources, especially podcasts and YouTube channels. This makes it possible to track the development of topics in an automated way. The approach is essential for social and political content but can also be used in different areas, such as technological developments. Automated monitoring of topic development makes it possible to identify trends early and perform a well-founded analysis.

References

Albalawi, R., Yeap, T.H., & Benyoucef, M. (2020). 'Using Topic Modeling Methods for Short-Text Data: A Comparative Analysis.' Frontiers in Artificial Intelligence, 3.

Angelov, D. (2020) 'Top2vec: Distributed representations of topics', arXiv preprint arXiv:2008. 09470.

Blei, D. M., Ng, A. Y. and Jordan, M. I. (2003) 'Latent dirichlet allocation', Journal of machine Learning research, 3(Jan), pp. 993–1022.

Boyd-Graber, J.L., Hu, Y., & Mimno, D. (2017). 'Applications of Topic Models.' Found. Trends Inf. Retr., 11, 143-296.

Brown, T. et al. (2020) 'Language models are few-shot learners', Advances in neural information processing systems, 33, pp. 1877–1901.

Cambria, E. et al. (2010). SenticNet: A Publicly Available Semantic Resource for Opinion Mining. AAAI Fall Symposium: Commonsense Knowledge.

Chowdhery, A. et al. (2022) 'Palm: Scaling language modeling with pathways', arXiv:2204. 02311.

Devlin, J. et al. (2018) 'Bert: Pre-training of deep bidirectional transformers for language understanding', arXiv preprint arXiv:1810. 04805.

Grootendorst, M. (2022) 'BERTopic: Neural topic modeling with a class-based TF-IDF procedure', arXiv preprint arXiv:2203. 05794.

Hall, D., Jurafsky, D. and Manning, C. D. (2008) 'Studying the history of ideas using topic models', in Proceedings of the 2008 conference on empirical methods in natural language processing, pp. 363–371.

Krauss, O., Aschauer, A. and Stöckl, A. (2022) 'Modelling shifting trends over time via topic analysis of text documents', Proceedings of the 21st International Conference on Modelling and Applied Simulation MAS 2022.

Le, Q. and Mikolov, T. (2014) 'Distributed representations of sentences and documents', in International conference on machine learning. PMLR, pp. 1188–1196.

Ma, B. et al. (2016) 'Public Opinion Analysis based on Probabilistic Topic Modeling and Deep Learning'. Pacific Asia Conference on Information Systems.

Masood, A., & Hashmi, A. (2019). 'Text Analytics: The Dark Data Frontier.' Cognitive Computing Recipes.

McInnes, L., Healy, J. and Melville, J. (2018) 'Umap: Uniform manifold approximation and projection for dimension reduction', arXiv preprint arXiv:1802. 03426.

Mikolov, T. et al. (2013) 'Efficient estimation of word representations in vector space', arXiv preprint arXiv:1301. 3781.

Ouyang, L. et al. (2022) 'Training language models to follow instructions with human feedback', arXiv preprint arXiv:2203. 02155.

Pennington, J., Socher, R. and Manning, C. D. (2014) 'Glove: Global vectors for word representation', in Proceedings of the 2014 conference on empirical methods in natural language processing (EMNLP), pp. 1532–1543.

Raaijmakers, S., den Hartog, J. and Baan, J. (2002) 'Multimodal topic segmentation and classification of news video', Proceedings. IEEE International Conference on Multimedia and Expo, 2, pp. 33–36 vol.2.

Radford, A. et al. (2022) 'Robust Speech Recognition via Large-Scale Weak Supervision'. Available at: https://cdn.openai.com/papers/whisper.pdf.

Salvador, J., Ruiz, Z., & Rodríguez, J.G. (2017). 'A Review of Infrastructures to Process Big Multimedia Data.' Int. J. Comput. Vis. Image Process., 7, 54-64.

Settembre, M. (2012). 'Towards a hyper-connected world.' 2012 15th International Telecommunications Network Strategy and Planning Symposium (NETWORKS), 1-5.

Sievert, C. and Shirley, K. (2014) 'LDAvis: A method for visualizing and interpreting topics', in Proceedings of the workshop on interactive language learning, visualization, and interfaces, pp. 63–70.

Stappen, L., Baird, A., Cambria, E., et al. (2021) 'Sentiment Analysis and Topic Recognition in Video Transcriptions', IEEE Intelligent Systems, 36, pp. 88–95.

Stappen, L., Baird, A., Schumann, L., et al. (2021) 'The Multimodal Sentiment Analysis in Car Reviews (MuSe-CaR) Dataset: Collection, Insights and Improvements', arXiv [cs.MM]. Available at: http://arxiv.org/abs/2101.06053.

Thoppilan, R. et al. (2022) 'Lamda: Language models for dialog applications', arXiv:2201. 08239.

Vaswani, A. et al. (2017) 'Attention is all you need', Advances in neural information processing systems, 30.

Vayansky, I. and Kumar, S. A. P. (2020) 'A review of topic modeling methods', Information Systems. Elsevier, 94, p. 101582.

Wiedemann, G., Yimam, S.M., & Biemann, C. (2018). 'A Multilingual Information Extraction Pipeline for Investigative Journalism.' ArXiv, abs/1809.00221.

Zhu, Q., Shyu, M.-L. and Wang, H. (2013) 'VideoTopic: Content-Based Video Recommendation Using a Topic Model', 2013 IEEE International Symposium on Multimedia, pp. 219–222.

Co-creative Twinning: Participatory Practices and the Emergence of Ownership in Digital Urban Twins

Rosa Thoneick[1][2]

[1]Hafencity University, Hamburg / CityScienceLab, Germany

[2]Heinrich-Böll-Foundation, Germany

Abstract. This paper presents a unique case study of co-creative modelling in a digital urban twin, exploring the inclusion of diverse concerns, stakeholders, and practices in the building of a complex socio-technical system. It does so by employing a co-creative methodology for modelling complex socio-ecological processes in the Connected Urban Twins Project (CUT) Hamburg. The methodology involves early engagement of stakeholders during problem formation and collaboration through a series of co-creation workshops. Through the examination of this collaborative effort, this research aims to describe the relevant factors and practices associated with co-creative twinning, particularly in the context of engaging diverse stakeholders in building socio-technical systems. By analysing this process, valuable insights and lessons will be derived for twinning experts seeking to involve citizens and other stakeholders in their twinning projects. Furthermore, this research critically reflects on the emerging interactions and outcomes of the twinning process, discussing the feasibility of the methodology in terms of enhancing transparency, building trust, reconfiguring knowledge and stakeholders in digital urban twins, as well as supporting collective decision-making and ownership. In order to support twinning experts in co-creative efforts, the research derives lessons learned suitable for involving diverse stakeholders in co-creative twinning efforts.

Keywords: Digital Urban Twins, Co-creation, Participatory Modelling, Participatory Digital Urbanism, Sustainability

1 Introduction

In recent years, digital urban twins (DUT) have become crucial components of digital cities. While a formal definition of DUT is still lacking, it is generally acknowledged that a digital twin is understood as a virtual representation of a physical entity, driven by data and utilised for prediction, monitoring, control, and optimisation (Clemen *et al.*, 2021, pp.

45). This can have the form of, but is not limited to, 3D-model of cities, VR applications in planning, or urban data platforms. Batty (2018, p. 1) suggests that any such system resembling the operation of another is a model. And models are abstractions – a representation of the system that does not aim to replicate the original in the same level of detail. This process of representation thus is a practice of constructing a twin through the inclusion of some data and exclusion of other.

However, existing definitions overlook the knowledge and data included in the twin and the stakeholders involved in its construction. Solman *et al.* (2022) argue that some concerns, especially those related to social aspects, are often excluded from twins due to their complexity. Batty (2018) further supports this notion, stating that these models rarely incorporate the social and economic functions that shape a city. Consequently, defining a twin as an object fails to recognise *twinning* as an active process involving decisions and actions regarding its design, and the inclusion and exclusion of perspectives, knowledge and data.

To enable broader stakeholder participation and diverse practices, Solman *et al.* (2022) propose examining twinning processes from a co-creative standpoint, emphasising engagement and deliberation. Similar arguments are echoed in the model development community, advocating for multi-stakeholder modelling approaches to incorporate diverse perspectives in socio-technical systems (van Bruggen at al., 2019; Tolk *et al.*, 2022). Despite increasing calls for co-principles in modeling, empirical case studies and best practices in Digital Urbanism remain limited.

This research focuses on the co-creative twinning of complex social functions within a DUT using a participatory modelling approach. Specifically, the paper explores ongoing research in Hamburg's evolving modular digital urban twin infrastructure. It builds upon established participatory modelling frameworks in resource management and applies them to the development process of the Connected Urban Twin project. The case study involves representatives from public administration, civil society, and the private sector, who actively participate in co-creation workshops. The goal is to design a model addressing climate protection and social equity, specifically gentrification processes in Hamburg triggered by climate protection measures.

To guide this investigation, the following research questions are addressed:

Q1: How can complex socio-ecological topics be effectively modelled in a Digital Urban Twin through the active involvement of a diverse set of stakeholders?

Q2: Which new practices emerge from co-creative twinning, and how does this facilitate the emergence of agency, trust and ownership?

The paper is structured as follows: It begins by introducing the case study and clarifying key concepts. Next, the workshop methodology and co-creation process are presented.

The results section analyses the emerging twinning practices and challenges encountered during the co-creative modelling process, based on recently concluded workshops. The discussion section reflects on the research goals and presents preliminary conclusions.

2 Literature and Methods

2.1 Case Study

Prior to selecting the case study, the researchers had to define an umbrella topic leading the experiment. We select two seemingly opposing public values for the umbrella topic: climate protection and social cohesion. In bringing these topics together, we made it possible to expose safely the tension between their circumstances and discover hidden but valuable strategies in addressing and planning for both values.

Given its existing digital infrastructure, open data laws, and ongoing digitisation initiatives, Hamburg was selected as the case study for this research. It ranks highest among German smart cities, as indicated by a 2021 index (Statista, 2023a). With its population size of 1.89 million (Statista, 2023b) and commitment to achieving carbon neutrality by 2045 (Hamburger Senat, 2022, p. 16), Hamburg provides an ideal context for investigation. Additionally, the city has implemented policies like the social preservation ordinance (Soziale Erhaltungsverordnung) to safeguard residents from displacement in their neighbourhoods.

The CityScienceLab in Hamburg serves as a living laboratory[52], collaborating with the city's public administration to develop and test digital urban technologies. One notable research project conducted by the CityScienceLab is the Connected Urban Twins project (CUT), which has received substantial federal funding of 21 million Euros and stands as one of Germany's largest smart city initiatives. In the CUT, the cities of Hamburg, Leipzig, and Munich are working together to establish a modular digital infrastructure that enables the creation of what-if scenarios to enhance governance processes (Schubbe, 2023). As part of this endeavour, a series of real-world experiments are being conducted to test technologies with a diverse range of stakeholders.

This research is situated within one of these real-world experiments, comprising a four-month experimentation phase in the first half of 2023, preceded by a preparatory phase

---

[52] Living laboratories, here, are understood as an emerging instrument in innovation policy that tests new sociotechnical arrangements in situ and at a meso-scale, reconfiguring societies (Engels *et al.*, 2019). These test settings are characterized in their reciprocity with the environment which they modify (Marres and Stark, 2020).

of approximately three months. Noteworthy collaborators for this research include the project partners involved in the CUT (see acknowledgements).

2.2 Literature

Science and Technology Studies provide analytical resources to understand how technologies can be co-created and with what effects. A great deal of Participatory Design and Computer Supported Cooperative Work research is directed at designing computer-based systems, with interdisciplinary teams following rapid prototyping approaches. The field emerged first in private sector work environments as a reaction to the disruptive force of technological innovations, and aimed at strengthening workers' control over their work processes (Zimmerman and Forlizzi, 2014; Kensing and Blomberg, 1998). Likewise, user-centered design practices and Design Thinking emerged in Human-Computer Interaction, focusing on iterative design and development processes that put users and their needs at the center in order to ensure usability and uptake of products (Ghaoui, 2006; Stembert, 2017). While these practices have oftentimes focused on building prototypes, seldomly going beyond the early analysis and design activities, others have actively involved users throughout the entire development phase with the goal of developing general, tailorable software products. Such are the Cooperative Experimental System Design (CESD) school (Grønbæk *et al.*, 1997 & 2002) and the Participatory Modelling (PM) Community (Abrami *et al.*, 2021). The latter involves non-scientist stakeholders early in the modelling process, during the preparation and organisation stages, all the way to the follow-up stages such as dissemination and evaluation.

While CESD and PM approaches have been well established and documented in Human-Computer Interaction and Socio-Ecological Settings, case studies engaging these approaches in digital urbanism remain sparse. Despite an increasing amount of literature calling for a participatory approach to the Digital City, participatory digital urbanism is still oftentimes limited to the design analysis phase pre-development, or a co-creative delivery of services and products post-development, and is oftentimes facing the challenge of difficult integration into procedures of local governments (Harvey *et al.*, 2022).

By disregarding the construction of urban technologies, participatory digital urbanism misses the opportunity to engage with the wider implications of participatory processes within socio-technical systems, failing to meaningfully address its performativity and constructedness, and to transform scientific, democratic and political orders (Latour, 2007; Chilvers and Kearnes, 2020; Felt *et al.*, 2017).

It is this the goal for my research, engaging in the co-development of urban technologies with a diverse set of stakeholders through a relational perspective, reflecting on the constructed, emergent, and interconnected realities of digital participatory urbanism. We look at participation not just as a starting point for, or an outcome of, the development of urban technologies, but as the very means to build these. Thus, this research expands on Solman *et al.*'s (2022) call for scientists to engage in the co-creation of digital twins, learning about the practices of engagement and deliberation that digital twins can foster.

2.3 Methodology

By adopting the perspective of Solman *et al.* (2022), which emphasises the inclusion of diverse stakeholders in the early stages of the development process, this research places co-creation at the centre of digital urban transformation. Co-creation offers several advantages, such as accessing various levels of knowledge and uncovering latent and implicit needs and desires of participants (Thoneick *et al.*, 2021). It also facilitates collaboration between groups that typically wouldn't work together, fostering a shared understanding, safe spaces for sharing, and empowerment of minority perspectives (Sanders and Stappers, 2008).

Co-creation can be defined as a collaborative process involving the active participation of multiple stakeholders in the creation, design, and development of new ideas, services, or products (Van Praag, 2021). It recognises the significance of engaging city residents, policymakers, urban planners, technology developers, and other relevant actors to collectively shape and contribute to the design, implementation, and utilisation of digital twins. In recent years, these concepts have evolved toward more user-centric and co-creative approaches, particularly in technology development, where users are regarded as experts of their experiences. During co-creation, collaborators jointly define the problem and create the solution, uncovering latent knowledge that informs system architecture requirements (Stembert, 2017).

While the benefits of citizen involvement in smart city initiatives are widely acknowledged, disagreements remain about what constitutes „good" engagement (Felt *et al.*, 2017), and the absence of a solid conceptualisation of participation, co-production, and co-creation can result in superficial forms of engagement that fail to empower citizens, capture diverse perspectives and knowledge, and redistribute decision-making power. Our definition draws on several approaches in the field, delineating four essential conditions for a reflexive and transformative practice that we call co-creative twinning.

A first essential condition are the **twinners** involved: Co-creative twinning entails collaboration between the designers and implementers of digital urban twins and the beneficiaries of these models. It involves citizens contributing their input to create the

product (Ostrom, 1996; Boyle and Harris, 2009; Meijer, 2012). In the context of our co-creative twinning research, we involve various stakeholders in the creation and evolution of digital models of urban environments. We engaged with planning authorities, critical urban activists, civil society actors from the fields of climate urbanism and rental justice, representatives of proprietor's and tenants' organisations.

The second essential condition are the **practices** of co-creative twinning. Building on work in public administration research, we see co-creative twinning as an enhanced form of participation (Bovaird, 2007) in which citizens actively engage in the design, implementation, and evaluation of the Digital Urban Twin. Co-creation emphasises the collaborative efforts among diverse actors, including researchers, practitioners, users, and other relevant parties. This research made an active attempt to move beyond deliberative practices, actively co-creating the digital city model by engaging with concepts of the socio-technical system, engaging with digital tools, reading code snippets, and building the models literally with their own hands on a screen.

A third condition is the emergence of **agency** in the twinners by enabling twinners to actively contribute to the design and implementation of public initiatives. The notion of agency is closely tied to power – spatial agency implies that it is possible to engage transformatively with structure, being able to intervene in the world with the effect of influencing a specific process or state of affairs (Awan, Schneider and Till, 2011). In our research, we examined agency as a way to share decisional power on the aspects included in the modelling process and shape the process according to participants' needs and wishes.

A fourth condition of co-creative twinning is the **reflexivity** of the process. Coproductionist STS perspectives have started to consider participation as objects of study and intervention of their own right, seeing participation as a constitutive of science and democracy rather than outside of it (Latour 1993; Chilvers and Kearnes, 2020). Committing to reflexive experimentation means ongoing responsiveness to emergence, openness about the uncertainties of participation, and attending to exclusions and inequalities within wider ecologies and systems of participation (Chilvers and Kearnes, 2020).

Our research in co-creative twinning, then, includes (1) examining the twinners involved, their needs and interests and the means of engaging a diverse set of stakeholders, (2) detecting emerging twinning practices and the reconfiguration of knowledge, (3) investigating agency and the sharing of decisional power, and (4) analyzing the process in regards to openness and reflexivity. By adopting this framework, the analysis provides a comprehensive understanding of co-creative twinning and its underlying elements.

2.4 Research Design

Following the above mentioned conceptualisation of co-creative twinning, the research expands on existing participatory modelling frameworks established in resource management, and designs and applies a custom-made methodological framework to the twinning process. The experimentation phase took place from February through May 2023 and consisted of four consecutive workshops. The first happened online via a video conferencing tool, aided by an online whiteboard tool for note taking. The other three workshops took place offline, in the location of the CityScienceLab in Hafencity Hamburg, using a Digital Multi Touch Table (Fig. 1). The research laboratory has a large experience space where workshops can be held, and its character as a non-governmental research institute helped to create a somewhat neutral space for participants from governance and activism. In the following, two intersected research strands are described. The first is the co-creative modelling methodology aiming at a collaborative twinning process, which is in both parts research methodology and case study description; the second is the methodology for data collection and analysis.

Figure 1: Workshop situation: Participants mapped aspects in an online tool using a Multi Touch Table.

2.4.1 The Co-creative Modelling Process

The goal formulation for the experiment phase was to design, implement and test a co-creative modelling workshop methodology that would invite diverse stakeholders to the process. In parallel, technological development was taking place and was informed by decisions made in the modelling workshops. These two iterative processes intertwined and iteratively conjoined along the timeline (Fig. 2), however, this research shall focus on the co-creation process. More information on the development process can be found in (Herzog, 2023).
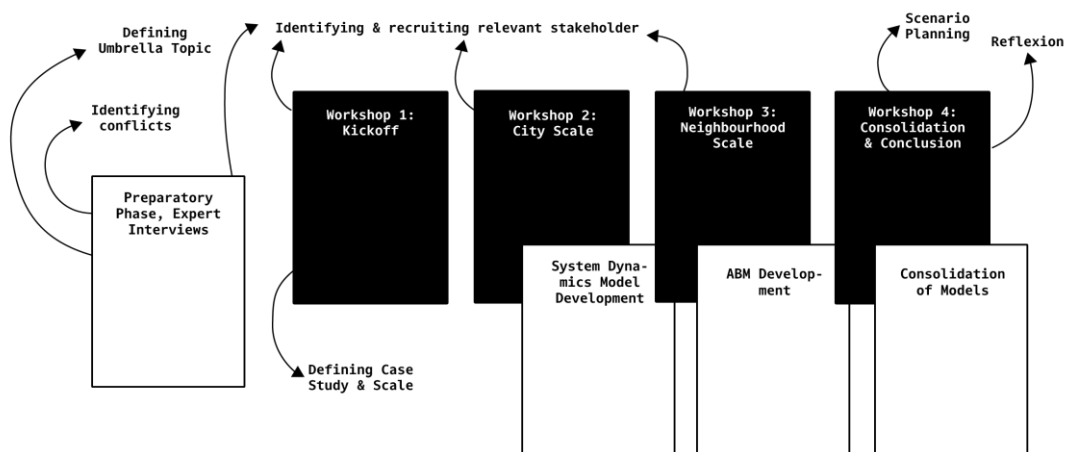
Figure 2: The experimentation process oscillated between planning and development phases conducted by the researchers (white), and workshop phases with stakeholders (black).

The twofold research process called for a flexible approach that would adapt in course of action based on participants' decisions and expressed needs, wishes and concerns. Cornerstones of the co-creation process were four workshops (Fig. 2), of which each had ramifications for the following workshop. The decision on an umbrella topic had consequences for the city-scale, the city-scale had an impact on the model type, the model type influenced the co-creative methodology. By not predefining topic, scale, model type, and methodology, we created an open-ended process that allowed for participants to have influence on the problem framing, the methods and the twinning procedure.

Voinov and Bousquet's (2010, 1273) stages of participatory mapping[53] helped frame activities, as they define elements of the modelling process that can be rearranged in

---

[53] The stages of a participatory modelling process are: identify project goals, identify and invite stakeholders, choose modelling tools, collect and process data, discuss system & build conceptual model, run model & discuss results, discuss and define scenarios, analyze model & discuss improvements, present results to other stakeholders and decision makers. These stages include loops back and forth, can

order. In our participatory modelling process, these stages were conjoined into (1) a preparatory phase to define the umbrella problem in a student workshop by building Wicked Questions[54] merging two opposing topics together, resulting in the topic of climate protection and social equity, and identify conflicts within that umbrella topic through informal expert interviews, (2) the Kickoff workshop, where a specific case study was selected within the larger umbrella topic of climate protection and social equity, and decisions were made on the scale the simulation models should represent and the questions they should address, (3-6) the development phase of two models of Hamburg that cover the aspects and their relations identified by the stakeholders, (7) simulation of various scenarios with policy levers and reflecting together with the research team on the simulation results and the feasibility of such systems in order to support their practice, and (8) consolidating both models and integrating them in the wider context of the Digital Urban Twin. Identifying relevant stakeholders involved in that realm and recruitment through a snow-ball system was an ongoing activity throughout the process.

The stakeholder selection is a crucial factor in co-creative processes as it significantly influences the outcome of the designed model, product, or service. In our study, stakeholder acquisition was an ongoing process. It involved desk research, personal recommendations, and existing networks. Expert interviews were conducted to gain insights into climate protection and social equity, followed by a mapping of relevant stakeholders. The umbrella topic of climate protection and social justice was defined early in the process. For stakeholder selection, we defined **areas of expertise**: for the *administrative and legal* view we selected the local government ministries for planning, housing, nature and climate protection and members of the district advisory board, for the *planners'* view we selected district planning offices and private planning companies, for the *aggregated perspectives of tenants', climate protection and social justice* we selected non-governmental organizations in the realms of coding and fab labs, environmental and climate protection, tenant counseling and housing associations, and for a representation of *directly afflicted perspectives*, we selected tenants and property owner associations as well as neighbourhood initiatives. Representatives of these areas of expertise were then identified either through desk research or personal networks, and subsequently contacted via email or telephone. The aim was to have at least one representative from each area of expertise present in each workshop, however this goal could not always be achieved. Some participants represented several perspectives (a lawyer in tenant counselling can at the same time be a person directly afflicted by push-

---

be reordered, and don't necessarily all have to be met within one participatory modeling process. (Voinov and Bousquet 2010)

[54] Wicked Questions are a method of a collection of group processes and methods named *Liberating Structures*. Groups can use Liberating Structures to facilitate innovative collaboration and radically change interaction. More information on https://www.liberatingstructures.com/

out dynamics in their neighbourhood), however they were counted in their primary role (Fig. 3). Stakeholders were also identified through professional and personal networks of project partners and researchers. A snowball system was employed, with participants who agreed to participate suggesting other relevant stakeholders.

	Participants	Areas of Expertise
Workshop 1	9	admin & legal: housing (2), planner (3), tenant counsellors (2), urban justice activists (2)
Workshop 2	3	admin & legal housing (2), tenant counsellors (1)
Workshop 3	6	admin & legal housing (2), tenant counsellors (2), direct tenant (1), direct landlord (1)
Workshop 4	5	admin & legal housing (3), tenant counsellors (2)

Figure 3: Participation varied between the workshops with highest attendance by members of the housing administration and tenant counsellors. Climate protection representatives had been invited but were unable to attend any of the workshops.

The **first workshop** was framed as a 2-hour online kickoff workshop. It aimed at bringing together the working group and presenting the umbrella topic of climate protection and social equity. It let participants formulate and vote on the question under the umbrella topic, deciding on the scale of the model and setting the subsequent time frame according to their availability. This resulted in the question formulated: "How can we uncouple ecological modernisation and economic gentrification?". Participants decided it would be beneficial to model this topic on two scales, the entire city scale and the neighbourhood scale (Fig. 4). This led the project team to the change the process and methodology supporting the building of two models: a system dynamics model[55] for the entire city and an agent-based model[56] for the neighbourhood scale.

---

[55] System Dynamics is an analysis tool that describes a system in terms of its structure and function that generate system behaviour. System Dynamics modelling is most useful for understanding the behaviour of trends over time. (Exter and Specht, 2003).

[56] Agent-based models are computational models that are able to express the dynamics of complex adaptive systems, including the behaviour and interactions of agents within the simulated time and space of a virtual environment. A distinct feature of ABMs is the capacity for linking micro-, meso-, and macro-level factors, shedding light on macro-phenomena emerging from micro-level behaviors and meso-level network interactions. (Shults and Wildman, 2020)

Figure 4: Screenshots from the first modelling exercise (in German). Left: Participants posted relevant aspects of the selected case study (Economic Gentrification vs Ecological Modernisation) on sticky notes. Right: Participants decided to examine the city-scale and the neighborhood-scale, and relate them to the building scale.
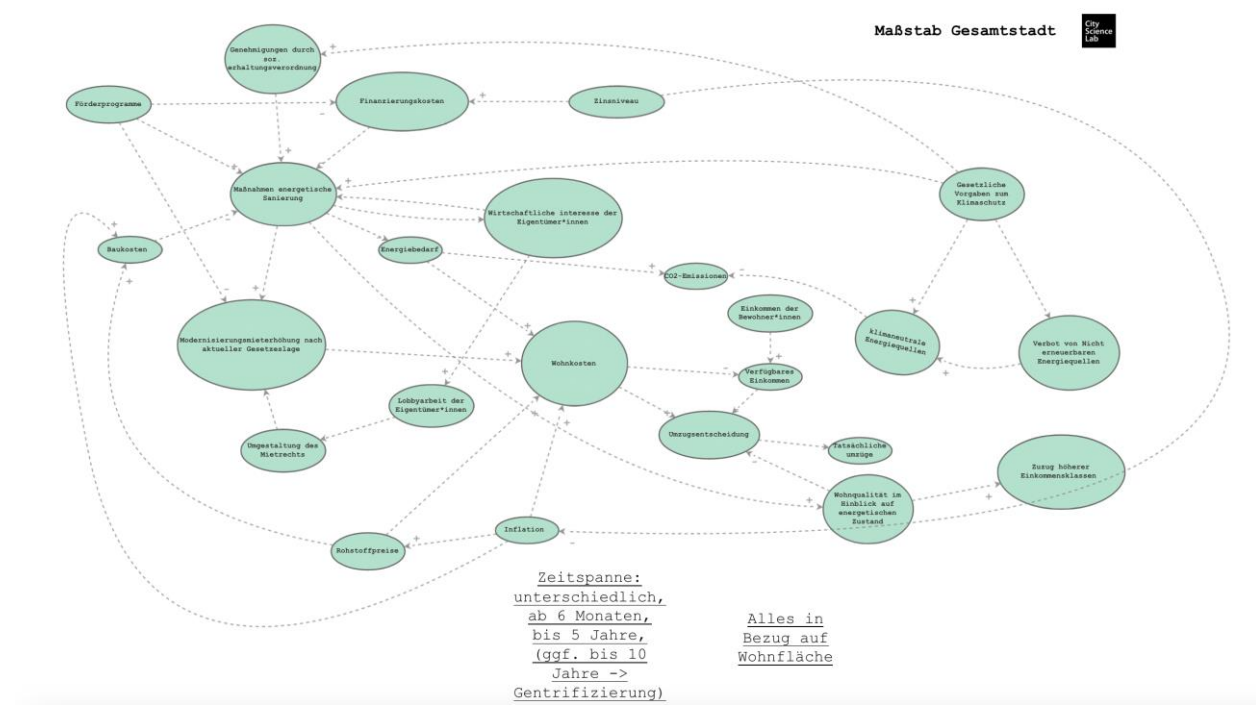
Figure 5: Screenshot from the second workshop (in German): A system dynamics model of the city scale, in which relevant aspects within the case study were mapped and put in relation to each other. For instance, economic modernisation was put in relation to funding programmes, financing costs and permission requirements. Gentrification was translated into the decision to relocate, which was put in relation to disposable income, and living costs.

Figure 6: Screenshot from the third modelling workshop: A map was created showing the interaction of direct actors (large cloud) and indirect actors (small cloud), resources (rectangle), and dynamics (diamond). Participants identified tenants, proprietors, and local business owners as main actors. Main resources were the willingness to invest, counseling offers, funding, and disposable income. Main dynamics were push out, rent increase, financing incentives, change of social structure.

Figure 7: Screenshot from the resulting ABM model, showing interconnections of ecological modernisation and economic gentrification on a meso level for the selected neighbourhood. This model was used in the fourth workshop for testing scenarios.

The **second workshop** then aimed at building the system dynamics model, making use of existing group modelling frameworks (Voinov and Bousquet, 2010; Exter and Specht, 2003; Barreteau, 2003). The half-day workshop was facilitated by a project member of the CUT team, and ideas were mapped using a digital multi touch table and the web based modelling tool *Insight maker*[57]. Participants were asked to name all important aspects of the topics of ecological modernisation and economical gentrification, which included defining these concepts. In a second step, the aspects were put in relation to each other, the third step was operationalising them (Fig. 5). In a second phase, potential neighbourhoods were jointly selected with the stakeholders, based on development areas and areas in the social preservation ordinance.

The **third workshop** focused on the selected neighbourhood, aiming at jointly defining the relevant aspects for the agent-based model by applying an adapted ARDI methodology[58]. In this full-day workshop participants jointly discussed relevant actors, defined the resources those actors were managing, included drivers of change as dynamics in the field, and mapped the interactions (Fig. 6). After this workshop, the project team translated the workshop results into an ABM model using the tool Netlogo[59].

The workshop results were presented in the **fourth workshop**.[60] In this half-day session, the two models were discussed in terms of what concepts were missing from them. The participants were then invited to formulate scenarios that could be tested with the twin models (Fig. 7). In testing the scenarios, discussion arose over concepts and policies. In the final reflection, questions were answered regarding the applicability of the model in work and policy contexts.

---

[57] https://insightmaker.com/

[58] ARDI (Actors, Resources, Dynamics, and Interactions) is a co-construction method for participatory modelling, usually used in natural resources management. In participatory workshops, various stakeholders co-construct a "conceptual model" of the functioning of a context or territory, according to an overarching, negotiated development question. This sharing of representations is done by means of a series of workshops during which Actors, Resources, Dynamics, and Interactions constituting the profile of the territory are identified and clarified. (Etienne *et al.*, 2011)

[59] https://ccl.northwestern.edu/netlogo/

[60] Both models have not yet been published, but the data can be downloaded.
The System Dynamics model data can be downloaded here: https://cloud.hcu-hamburg.de/nextcloud/s/YoP2zg3RsgMKyrf
The ABM model data can be downloaded here: https://cloud.hcu-hamburg.de/nextcloud/s/a5PfsxBXrEWJzCJ

2.4.2 Data Collection and Analysis

This research follows an explorative research design, oscillating between ethnographically-inspired field work and theory adoption (Brüsemeister, 2008). Data collection was conducted during the four above mentioned workshops, but extended over the whole preparation phase, starting around late summer in 2022. Data was gathered in team meetings, both online and offline, during informal interviews with participants, expert interviews, in workshop settings and in reflection conversations. The material was gathered using participatory observation, informal interviewing and document analysis, and consisted of observation notes, field diary notes, interview transcripts, meeting notes, photographs, audio recordings, emails and other artifacts of communications such as powerpoint presentations, as well as the workshop results documentation. The material was coded in MaxQDa using open codes (von Oertzen, 2006). Of these codes, clusters of relevant aspects were formed in relation to the research question and the four dimensions of co-creative twinning:

(1) Twinners: This includes codes on stakeholders involved in the co-creative twinning process, both internal and external to the CUT project. Analysis focused on the conditions for and access to participation. The codes included subgroups (1.1) Building Community, (1.2) Performing Expertise, (1.3) Finding and Making Time.

(2) Practices: This category includes codes showing the practices of collaboration that emerge when citizens actively engage in design activities. This category includes codes of the subgroups (2.1) Filling Gaps, (2.2) Making explicit, (2.3) Quantifying Uncountables.

(3) Agency: The third category encompasses findings on moments when twinners were able to engage transformatively with the structure or process, shaping the process according to their expression of needs and wishes and actively contributing to the design and implementation of the twin. This includes subgroups (3.1) Switching and Staying in Perspective, (3.2) Appropriating the process, (3.3) Co-owning the Product.

(4) In the fourth category, the focus is on moments that highlight the reflexivity of the process. This entails responsiveness to emergence, openness about uncertainties, and attending to exclusions and inequalities of the system of participation. The code subgroups here are (4.1) Transparency and Trust, (4.2) Designing for (Dis-)Order, (4.3) Open-Endedness.

The results will be presented in concise paragraphs referring to the data and related documents. An interpretation and discussion of the results will be provided in the subsequent chapter.

3 Data and Results

3.1 Twinners

3.1.1 Building (and Making Use of) Community

It is important to highlight the relevance of **existing personal networks**, as they played a major role in participant recruitment. Cold-call email acquisition had a lower success rate than recruiting participants through personal networks. One stakeholder's agreement to participate was based solely on a strong existing relationship with one of the researchers:

I didn't know what I was doing here, but because I've known (…) for ages, I came. When he asks me to come, I come. (WS3/1, Pos. 333[61])

Existing relationships came into play during the workshops. Participants who knew each other previously used the time together to **catch up on work** amidst their busy calendars. During the online workshop, one participant wrote to another in the chat about a work-related topic, and addressed her during the introduction round:

„Please check the chat, if I can't reach you otherwise." (WS1/1, Pos. 19)

Some participants were co-workers who aimed to **coordinate their inputs** and reach agreements on topics before engaging with the group (WS2/1, Pos. 61-67 & 294; WS4/1, Pos. 66-67).

New relations were also formed during the process. Two participants working in the same field but previously unknown to each other developed familiarity and even **formed alliances** to advocate for their agendas (WS3/1, Pos. 315). Participants **socialised** during breaks and workshops, further strengthening community bonds. Practices of **storytelling** and **humour** were employed by participants and facilitators alike. Humour helped overcome frustration in difficult situations, and it also facilitated understanding across political disagreements. As participants were asked to map the process of rental increase in the third workshop, the representative of landowners and the counselors for tenant rights had opposing views which could have led to conflict bus was dissolved by humor (WS3/1, Pos. 322-327). Storytelling was employed to share knowledge on complex definitions. In one example, children had been identified as specifically vulnerable through displacement induced by neighbourhood relocations, and the cushioning effects of social networks have been emphasised through storytelling (WS3/1, Pos. 226-229).

---

[61] Subsequently, the quotations will disclose the source data by referencing workshop number, document number and position in the document in the following style: WS3/1, Pos. 333 = workshop 3 / document 1, Position 333).

3.1.2 Performing Expertise

Stakeholder participation fluctuated throughout the process, with varying numbers present in each workshop. The core workshop group consisted of members from urban planning authorities, tenant associations, a resident, and a representative from property owners. While the main roles were represented, participants also **included perspectives from non-present roles**. Through their collaboration with actors in their field, they were aware of the requirements important to these actors. For example, a property owner contributed knowledge on building funding programs by federal investment banks (WS3/1, Pos. 358), and a member of a neighbourhood association provided insights on elder tenants (WS1/1, Pos. 109).

Participants **emphasised their experience** in the field, either in terms of years of service („After years of dealing with the subject matter (…)", WS1/1, Pos. 89) or involvement in lighthouse projects that had received considerable publicity (WS1/1, Pos. 28). This performance of expertise became apparent in the starting phase of the project during introductory moments and more noticeably during controversial discussions (WS3/1, Pos. 364-366; WS4/1, Pos. 60-62).

3.1.3 Finding and making time

Participants' availability and willingness to participate in the workshops were strongly influenced by the time resources they had. Those invited in their professional roles were able to dedicate their working hours and were available on weekdays during office hours. Those invited based on their non-occupational roles had to find time during their leisure hours, often in the evenings. Participants with care responsibilities were more available in the mornings during school hours. Counsellors working with marginalised communities faced time constraints towards the end of the month due to the accumulation of legal actions related to leases ending. Most participants expressed regret over having **limited time** (WS1/1, Pos. 21 & 198). **Coordination of dates** thus became important, and workshop dates were timed according to participant's availabilities (WS1/1, Pos. 198 & 199). Being pressed for time resulted in participants **leaving the workshops earlier or joining later** (WS1/1, Pos 67 & 188). **Last minute cancellations** resulted in important perspectives not being present in the workshops (WS1/1, Pos. 245).

The **willingness to clear their schedule** was also influenced by how well they understood the experiment and if they saw how they could achieve an impact by participating. One neighbourhood activist from the critical urbanism community declined his participation via email after attending the kickoff workshop, as he did not want to invest his limited time to a project he did not see value in:

I wanted to let you know that I can't (and don't want to, it's always a matter of priorities) afford to take part in the project any longer. (…) I don't really see where fundamental criticism or other approaches could be implemented or even discussed in this modelling project. (…) I don't have the resources for a small-scale technocratic discussion. (WS1/2, p. 1)

If participants understood the experiment well and saw how they could make an impact, or if the topic was relevant to their interests, they were more likely to clear their schedule for the workshops:

I know the next meeting is during my holiday. But if I were to be in Hamburg then, I would actually come to it during my holiday too, because I find it really exciting. (WS3/2, Pos. 18)

3.2 Twinning practices

3.2.1 Filling Gaps

Participants noticed and pointed out missing actors (WS1/1, Pos. 58; WS2/2, Pos. 195; WS3/1, Pos. 257-258). Some actors had not responded to the invitations (WS3/1, Pos. 257-258), had dropped out of the process (WS3/1, Pos. 12) others had cancelled their participation last minute (WS1/1, Pos. 14) or not shown up without further notice (WS3/1, Pos. 18).

However, the present participants made an effort to include those missing perspectives in the workshops. So did the tenant counsellor take on the role of economist (WS2/1, Pos. 195), or provided knowledge on tenant law (WS2/1, Pos. 165-166). And others pointed out the specific situation of elderly tenants (WS 1/1, Pos. 109). In a several instances, gaps in the built model were noticed by several participants at the same time, independently (WS2/1, Pos. 183-184).

3.2.2 Making explicit

Given the abstract practice of building a digital model, unclarity was expressed at times. Throughout the workshop, several practices of making explicit emerged, such as asking each other, explaining concepts, clarifying abstract notions, building coherence, specifying ideas, and reducing or extending complexity:

From the question that was there at the beginning to what we have worked out now, we have somehow made the problem less complex and at the same time it is still complex, but much more understandable. (WS2/2, Pos. 8)

During a simulation exercise in workshop 4, a scenario was selected to test the impact of a new policy capping the percentage of modernisation costs that could be transferred to renters. However, the results showed that the rent continued to rise regardless of the

policy setting. In testing which factor dominated the calculation, participants found that inflation commanded the rent increase more than any other factor. This instigated a discussion on missing factors in the model that could counterbalance inflation. The participants recognised the deceptive nature of the inflation factor and agreed to differentiate it into "pay increase" and "total price increase." The model did not only facilitate the testing of policy recommendations, but also made explicit which factors had been deemed of essence, and which had not been included, and the reasons why.

Participants expressed that through the simulation of the models, relevant and irrelevant strategies became apparent:

And I believe that these models offer the possibility of a much better qualified exchange about individual aspects. (…) I think we can then somehow steer the discussion a little bit, so that we can say, ‚Are we going to talk about nothing here or are we going to tackle the big issues somewhere?' I think that could support something like that very well. (WS4/2, Pos. 3)

3.2.3 Quantifying uncountables

In the modelling process, participants faced the challenge of **quantifying abstract concepts** related to the nexus between energetic modernisation and gentrification through rent increase. Some indicators could be easily calculated (rent = net cold rent + utilities), obtained from available data sets (number of residents in selected neighbourhoods), or were fixed numbers that could be taken from statistical or public data (inflation level, average square metre rental price). Others, such as ‚knowledge on tenant law', ‚social networks', or ‚decision to relocate', proved difficult to quantify. To give an example: When discussing the indicators of a social network for the agent-based model, participants named the number of contacts, the level of efficiency of these contacts, the contacts in the right positions of power, the law competence of the contacts, and the number of advice centres (WS3/1, Pos. 253). Participants recognised the importance of including these factors in the model, even if their quantification seemed impossible. It was decided to model these concepts as fluid factors on a scale from low to high, acknowledging their influence on other factors.

3.3 Agency

3.3.1 Switching and staying in perspectives

Participants employed various strategies to address differing perspectives. Those included, but were not limited to, objecting, overruling, finding consensus, agreeing. However, in cases where conflicting perspectives emerged, **negotiation and constructive discussions** took place. For instance: During a mapping exercise, two opposing perspectives were negotiated. The perspectives of the representative of

proprietors, who focused on the profitability of modernisation measures, differed from those of the lawyers advocating and counselling for tenant rights, who focused on the affordability of housing. The group had identified "displacement" as an important process and was attempting to map out the individual process steps. The proprietor differentiated that this process would proceed differently for tenants than for residing proprietors, as tenants would face the result of rent increase, but residing proprietors would face the result of compulsory reconstruction with differing effects. The group decided to map two different processes for each stakeholder group (WS3/1, Pos. 306-313).

In the process, participants mentioned how they gained knowledge from each other (WS2/2, Pos. 3), but even more, that the process is suitable to teach about the complexity of urban planning:

I found it very exciting to see how what we did in the morning now assembled. Sometimes I had difficulties to combine some things in a logical way. But I believe it is very difficult, because we chose two unbelievably complex questions. (…) And I learned a lot and found it very interesting to bring in all these facets and on the other hand reduce the complexity. (…) You could really sense today that urban planning is immensely complex. (WS3/2, Pos. 10)

3.3.2 Appropriating the process

Participants showed a strong interest in the topic and its potential impact, leading them to allocate time and effort to participate in the workshops. They expressed a **desire for new knowledge** to support their work and recognised the workshops as an **opportunity to connect with others** in their field (WS1/1, Pos. 18, 22 & 26; WS2/2, Pos. 3; WS2/1, Pos. 165-166; WS3/2, Pos. 3). They used the workshops as a platform to exchange information and connect on related projects. Specifically during the pauses, participants gathered around the catering area or in other areas of the room, exchanged on recent events relevant to their work, or connected on projects that needed updating (WS1/1, Pos. 19; WS3/1, Pos. 153).

Additionally, participants used the workshops to achieve their individual goals, putting their topics on the agenda and campaigning for modelling an ideal state. For instance when discussing the questions that should be modelled:

(The important question is) who uses how much housing in the city. We are always told we need more housing space. What is disregarded there is, that social housing has clear guidelines regarding the number of square metres. But in owner-occupied housing there is no political control of how much space people use. This question would be important to me to depict in the model, because it is a question of justice. (WS1/1, Pos. 134)

3.3.3 Co-owning the product

The high relevance of the topic and the perceived possibility to create an impact can be described as one of the most motivating factors for participation. Participants mentioned their interest during the preliminary interviews as well as in the workshops (Documents 0/1, 0/2, 0/3, 0/4 and WS1/1). They captured the modelling states, requested documentation and screenshots for reporting purposes (WS1/1, WS2/1).

Participants **developed a sense of ownership** and took pride in the final product. Upon reflecting on the co-creative work, one participant said:

I found it super constructive. I came here with relatively few expectations or few concrete ideas, and I find it amazing that we have now, let's say, got a model together. And it's interesting what you were able to contribute to it and what has become of it and what I was able to take away from all of you and what I found, yes, what I learned. (WS2/2, Pos. 3)

Two explicit moments of co-ownership became apparent throughout the end of the process. A tenant-lawyer reported about a federal assembly of their tenant alliance where they would like to present the tool in order to support their lobby work (WS4/2, Pos.18-22). Another participant employed by the ministry of housing and urban development showed interest in presenting the results to their partnering ministries in other German states (WS4/3, Pos. 13).

3.4 Reflexivity

3.4.1 Transparency & Trust

Building a digital model of a social process co-creatively is in itself quiet a complex and abstract undertaking. Turnout for participation might have been influenced by this, however the data to proof this is lacking as participants did not always share their reasons for not joining the experiment. Those participants who did take part, expressed how confusion turned into understanding, showing they held a **tolerance for disorientation** during the process: „I felt like the others – before I had a knot in my head – what do they want? – this has dissolved. I find it so great that I want to continue to participate." (WS 1/1, Pos 218

Holding the space for disorientation and guiding participants to the end helped to create trust in the process. This was aided by the transparent process structure:

I did not only understand the question, I also won trust. In the way that; the clutter will dissolve eventually and I will have the insight. I found that incredibly terrific. (WS4/2, Pos. 22)

3.4.2 Designing for (dis)order

Following Voinov and Bousquet (2010), the process steps and a minimal structure were defined, which could be shuffled and allocated as needed. The overall time frame for the process was set from February to April, with three stages: Kickoff, Modelling, and Conclusion. The workshops took place in the showroom of the CityScienceLab in Hamburg, and the overarching topic was climate protection and social justice. Detailed decisions were made collectively, including continuously reformulating the research question and setting the scale, which impacted the process, such as transitioning from one model to two models and conducting separate modelling workshops.

For the researchers, the openness of the process was important to allow for emerging co-ownership. Various strategies were employed to provide stability within the open process. Before each meeting, a comprehensive information document was shared, outlining the process steps, previous workshop results, and the goal of the upcoming meeting. Meetings began with reading the agenda and introducing everyone, followed by presenting outputs from previous workshops and ending with a reflection round. Strict time management was implemented during the workshops to avoid exceeding the allocated time. Ample breaks were incorporated into the program for recovery and socialising, and catering was provided. Each workshop was followed by a summary of the results and an outlook on the next steps.

Participants admitted feeling confused at times and uncertain about the project's outcome, but they also appreciated the systematic agenda and strict timing as that provided a sufficient framework for productive collaboration (WS2/2, 3/2). By offering a stable framework, trust was established, giving stakeholders the security for experiencing confusion.

It is a very complex topic and I had my problems imagining what would be the result. But the system you used was very helpful in structuring the steps and the result at the end. Even though it still looks very complicated, it has brought order to the whole thing. In a comprehensible way, where we could incorporate our, let's say, our knowledge. So the idea to make the development of such models more transparent, and people who are involved with it on a daily basis can give their input, I think that works well within this framework. (WS3/2, Pos. 11)

3.4.3 Open-Endedness

An element of Designing for Disorder was to design the process in such a way that it was open to changes. This way, participants had the agency to make alterations in the process, the timings, and the result. The process had to have this openness in order to allow for different models to be built in case participants were not agreeing with each

other. Only this openness allowed for a diversity of representation of reality. However, it also involved a higher level of organisation and trust.

When the co-creative process started, there was still uncertainty about the scale and number of models to be built, and thus, about the timeline of workshops. Without a pre-formulated vision of the resulting model, participants did not have a goal towards which to work and had to rely on the process and results emerging from it. While this was at times challenging, it allowed for constant input, influence and decision-making by participants who shaped the process and results.

It is a very complex topic and I always had problems imagining what the result will be. But I find this system that you use, in any case, I think it structures it very well. These steps and what comes out in the end. Even if it still looks very complicated, it has brought order to the whole thing. In a comprehensible way, where we could incorporate our, let's say, our knowledge. So the idea is to make the development of such models more transparent and to allow people who are involved in it on a daily basis to give their input. I think that works well within this framework. (WS3/2, Pos. 11)

3.5 Analysis

The results outline how the four dimensions of co-creation are manifested in the twinning case study. They indicate that a careful design of co-creative twinning workshops and consideration in selecting stakeholders is required to open up space for communication and acting together, allowing for the emergence of trust, transparency and agency. The analysis of the case study highlights 6 lessons learned for co-creative twinning, which are discussed below indicating challenges and potentials that play a role in understanding and designing for co-creative twinning.

The importance of stakeholder selection and community: The process highlighted the significance of carefully selecting stakeholders based on their expertise, in order to include a diversity of perspectives. Participants socialised during pauses and workshops, forming alliances and coordinating their inputs. Trust and familiarity between stakeholders played a role in their decision to participate. Existing networks, personal and professional relations that extend the project runtime can be used to recruit diverse perspectives to the process. Designing workshops in a way that allows for socializing gives participants the possibility to catch up on projects and extend their personal and professional networks, acting as a motivating factor.

The influence of roles and motivation on participation: The availability of time resources significantly influenced participants' ability to engage in the co-creative process. Time resources depended heavily on the role participants had during the workshops. Participants' availability and willingness to participate in the workshops were strongly influenced by their motivation and role in the process. Allowing flexibility in

setting the timeframe was crucial, but it also required higher organisational effort and introduced uncertainties in the project plan. Understanding the impact of time availability on participation can help in designing inclusive processes that accommodate different stakeholders' schedules.

Setting a minimum framework to allow for (dis)order: This is a challenge both to practitioners as well as involved stakeholders, however it is a prerequisite to allowing diverse perspectives to be included, to appropriate process and product. In defining a minimum framework, co-creative twinning practitioners can create boundaries that help foster trust in the twinning group. In letting other aspects undecided, practitioners can support negotiation and collective decision-making.

Co-creative modeling helps making latent knowledge explicit: Participants acknowledged that the models facilitated more qualified exchanges and helped focus the policy discussions on key issues. The modelling process allowed for a better understanding of the complexity of the urban context and the concept of gentrification. Through practices of inquiring, challenging, explaining, objecting, advocating and building coherences, participants engaged in reifying notions of the urban. The model and the modelling process supported making implicit knowledge tangible in exposing hidden assumptions. This observation was also validated by the participants who emphasised frequently how the process helped grasp the complexity of the urban and of the selected concept of gentrification.

Coping with conflict and differing perspectives: Participants employed various coping strategies when faced with conflict and differing perspectives. In cases where conflicting perspectives emerged, negotiation and constructive discussions took place. The model facilitated this negotiation, reconfigured knowledge and perspectives, and broadened the design space. Understanding these strategies can help in designing future co-creative processes that foster constructive discussions and negotiation of different viewpoints.

Developing co-ownership of the model: Participants developed a sense of ownership and took pride in the final product. By actively participating in the modelling process, they gained a deeper understanding of the tool and its underlying assumptions. Stakeholders appropriated the process for their own goals and expressed ownership of the product, taking it into other contexts. This highlights the potential for co-creative processes to generate value beyond the immediate project outcomes.

3.6 Conclusion

The research shows that complex models for digital urban twins can indeed be modelled co-creatively. The four dimensions of co-creative twinning have been helpful in analysing the dimensions of co-creation, and the research describes emerging practices and requirements for stakeholder involvement as well as potentials of co-creative twinning. It also reflects on the challenges of employing these methodologies and pitfalls to be mindful of. Further research could focus on the concrete outcomes of these processes on digital urban twins, both in terms of the structure and quality of the resulting models, as well as the quality of the source code. How does data of socio-ecological topics translate to the models, and how is complexity visualised and debated? The author looks forward to expanding on these topics, deriving a framework for analysis and defining design principles for co-creative twinning, and encourages other researchers to test the framework in different twinning settings.

Acknowledgments

References

Abrami, G. et al. (2021) 'Participatory modelling', in Biggs, R. et al., The Routledge Handbook of Research Methods for Social-Ecological Systems. 1st edn. London: Routledge, pp. 189–204. Available at: https://doi.org/10.4324/9781003021339-16.

Awan, N., Schneider, T. and Till, J. (2011) Spatial agency: other ways of doing architecture. Abingdon, Oxon [England]; New York, NY: Routledge.

Bale, C.S. (2018) Participatory modelling: A review of applications in energy whole-systems modelling to support decision making.

Barreteau, O. (2003) 'Our Companion Modelling Approach', Journal of Artificial Societies and Social Simulation, 6(1). Available at: https://www.jasss.org/6/2/1.html (Accessed: 11 June 2022).

Batty, M. (2018) 'Digital twins', Environment and Planning B: Urban Analytics and City Science, 45(5), pp. 817–820. Available at: https://doi.org/10.1177/2399808318796416.

Bovaird, T. (2007) 'Beyond Engagement and Participation: User and Community Coproduction of Public Services', Public Administration Review, 67(5), pp. 846–860. Available at: https://doi.org/10.1111/j.1540-6210.2007.00773.x.

Boyle, David and Harris, Michael (2009) The challenge of coproduction. How equal partnerships between professionals and the public are crucial to improving public services. Discussion paper. London: Nesta.

Brüsemeister, T. (2008) Qualitative Forschung: ein Überblick. 2., überarb. Aufl. Wiesbaden: VS Verlag für Sozialwissenschaften (Hagener Studientexte zur Soziologie).

Chilvers, J. and Kearnes, M. (2020) 'Remaking Participation in Science and Democracy', Science, Technology, & Human Values, 45(3), pp. 347–380. Available at: https://doi.org/10.1177/0162243919850885.

Clemen, T. et al. (2021) 'Multi-Agent Systems and Digital Twins for Smarter Cities', in Proceedings of the 2021 ACM SIGSIM Conference on Principles of Advanced Discrete Simulation. SIGSIM-PADS '21: SIGSIM Conference on Principles of Advanced Discrete Simulation, Virtual Event USA: ACM, pp. 45–55. Available at: https://doi.org/10.1145/3437959.3459254.

Engels, F., Wentland, A. and Pfotenhauer, S.M. (2019) 'Testing future societies? Developing a framework for test beds and living labs as instruments of innovation governance', Research Policy, 48(9), p. 103826. Available at: https://doi.org/10.1016/j.respol.2019.103826.

Etienne, M., Du Toit, D.R. and Pollard, S. (2011) 'ARDI: a co-construction method for participatory modeling in natural resources management.', Ecology and Society, 16(1)(44). Available at: http://www. ecologyandsociety.org/vol16/iss1/art44/.

Exter, K. den and Specht, A. (2003) 'Assisting stakeholder decision making using system dynamics group model-building.', Proceedings of APEN National Forum, p. 43.

Felt, U. et al. (eds) (2017) 'Sheila Jasanoff: Science and Democracy, in: Handbook of Science and Technology Studies, 2017, p. 259.', in The handbook of science and technology studies. Fourth edition. Cambridge, Massachusetts London, England: The MIT Press.

Ghaoui, C. (ed.) (2006) Encyclopedia of Human Computer Interaction: IGI Global. Available at: https://doi.org/10.4018/978-1-59140-562-7.

Grønbæk, K., Kyng, M. and Mogensen, P.H. (1997) 'Toward a Cooperative Experimental System Development Approach', in M. Kyng and L. Mathiassen (eds) Computers and Design in Context. MIT Press, pp. 201–238.

Grønbæk, K., Kyng, M. and Mogensen, P.H. (2002) 'Toward a Cooperative Experimental System Development Approach', in. Aarhus.

Hamburger Senat (2022) Eckpunktepapier für die zweite Fortschreibung des Hamburger Klimaplans. Available at: https://www.hamburg.de/contentblob/16763680/bdac8f8d932cbd784b9256426fc5b11b/data/d-eckpunktepapier2022.pdf (Accessed: 9 June 2023).

Harvey, F. et al. (2022) 'Participation in Software Development: Experiences and Lessons From the Hin&Weg Project', International Journal of E-Planning Research, 11(1), pp. 1–15. Available at: https://doi.org/10.4018/IJEPR.307563.

Herzog, R. (2023) 'Exploring multi-modelling approaches in Hamburg, Germany's evolving digital urban twin infrastructure', in. 22nd International Conference on Modelling and Applied Simulation (MAS 2023), Athens, Greece. Available at: https://doi.org/10.46354/i3m.2023.mas.001.

Kensing, F. and Blomberg, J. (1998) 'Participatory Design: Issues and Concerns', Computer Supported Cooperative Work (CSCW), 7(3–4), pp. 167–185. Available at: https://doi.org/10.1023/A:1008689307411.

Latour, B. (1993) We have never been modern. Cambridge, Mass: Harvard University Press.

Latour, B. (2007) Reassembling the social: an introduction to Actor-Network-Theory. 1. publ. in pbk. Oxford: Oxford Univ. Press (Clarendon lectures in management studies).

Marres, N. and Stark, D. (2020) 'Put to the test: For a new sociology of testing', The British Journal of Sociology, 71(3), pp. 423–443. Available at: https://doi.org/10.1111/1468-4446.12746.

Meijer, A. (2012) 'Co-production in an Information Age: Individual and Community Engagement Supported by New Media', Voluntas: International Journal of Voluntary and Nonprofit Organizations, 23(4), pp. 1156–1172.

Oertzen, J. von (2006) 'Grounded Theory', in Methoden der Politikwissenschaft: neuere qualitative und quantitative Analyseverfahren. Baden-Baden: Nomos, pp. 145–154.

Ostrom, E. (1996) 'Crossing the great divide: Coproduction, synergy, and development', World Development, 24(6), pp. 1073–1087. Available at: https://doi.org/10.1016/0305-750X(96)00023-X.

Sanders, E.B.-N. and Stappers, P.J. (2008) 'Co-creation and the new landscapes of design', CoDesign, 4(1), pp. 5–18. Available at: https://doi.org/10.1080/15710880701875068.

Schubbe, N. (2023) 'Urbane Digitale Zwillinge als Baukastensystem: Ein Konzept aus dem Projekt Connected Urban Twins (CUT)', zfv – Zeitschrift für Geodäsie, Geoinformation und Landmanagement, (1/2023), pp. 14–23. Available at: https://doi.org/10.12902/zfv-0417-2022.

Shults, F.L. and Wildman, W.J. (2020) 'Human Simulation and Sustainability: Ontological, Epistemological, and Ethical Reflections', Sustainability, 12(23), p. 10039. Available at: https://doi.org/10.3390/su122310039.

Solman, H. et al. (2022) 'Digital twinning as an act of governance in the wind energy sector', Environmental Science & Policy, 127, pp. 272–279. Available at: https://doi.org/10.1016/j.envsci.2021.10.027.

Statista (2023a) 'Index score of leading smart cities in Germany in 2021', Statista. Available at: https://www.statista.com/statistics/1233294/smart-cities-ranking-germany/ (Accessed: 9 June 2023).

Statista (2023b) 'Population Size Hamburg 1960-2022'. Available at: https://de.statista.com/statistik/daten/studie/155147/umfrage/entwicklung-der-bevoelkerung-von-hamburg-seit-1961/.

Stembert, N. (2017) 'Co-Creative Workshop Methodology Handbook'. Available at: https://doi.org/10.5281/ZENODO.1146240.

Thoneick, R. et al. (2021) 'Complex arrival procedures as a challenge in migration studies: a comparative analysis of quantitative and qualitative methodologies within migration research.', in L. Van Praag (ed.) Co-creation in Migration Studies. The Use of Co-creative Methods to Study Migrant Integration Across European Societies. Leuven: CeMIS Migration and Intercultural Studies.

Tolk, A. et al. (2022) 'How Can We Provide Better Simulation-Based Policy Support?', in 2022 Annual Modeling and Simulation Conference (ANNSIM). 2022 Annual Modeling and Simulation Conference (ANNSIM), San Diego, CA, USA: IEEE, pp. 188–198. Available at: https://doi.org/10.23919/ANNSIM55834.2022.9859512.

van Bruggen, Anne, Nikolic, Igor, and Kwakkel, Jan (2019) 'Modelling with Stakeholders for Transformative Change', Sustainability, 11(825). Available at: https://doi.org/doi:10.3390/su11030825.

Van Praag, L. (ed.) (2021) Co-creation in migration studies: The use of co-creative methods to study migrant integration across European societies. Leuven: Leuven University Press (CeMIS Migration and Intercultural Studies).

Voinov, Alexej and Bousquet, Francois (2010) 'Modelling with Stakeholders', Environmental Modelling & Software, (25), pp. 1268–1281.

Zimmerman, J. and Forlizzi, J. (2014) 'Research Through Design in HCI', in J.S. Olson and W.A. Kellogg (eds) Ways of Knowing in HCI. New York, NY: Springer New York, pp. 167–189. Available at: https://doi.org/10.1007/978-1-4939-0378-8_8.

Sustainability expectations towards Artificial Intelligence in the energy and mobility sector

Josephin Wagner[1], Friederike Rohde[1], Frieder Schmelzle[1]

[1]Institute for Ecological Economy Research, Berlin, Germany

Abstract. The rise of artificial intelligence (AI) is associated with narratives and visions of the future that claim to reduce complexity through predictability. Especially when it comes to the energy and mobility sector, the increased possibilities to analyse huge amounts of Data are said to enhance "objectivity, precision, predictability, and consistency in decision-making" (Vandycke & Irungu 2021). Futures studies have shown how visions, expectations or imaginaries are shaping scientific and technological developments (van Lente and Rip 1998) and seek to manage complexity and uncertainty (Beckert 2016). The multiple and contested future visions around AI (Barais & Katzenbach 2022) provide rich insights into the role of distinct orientations towards the future (Beck et. al) and how they are shaping what developments are considered relevant and urgent, possible, or inevitable. Our contribution is centered around two research questions: First, which expectations towards the future are voiced by which actors concerning the use of AI in the energy and mobility sector? And second, how do respective narratives of AI futures envision solutions for sector-specific sustainability challenges? Our contribution is based on two case studies containing document analyses and interviews. For the energy sector we investigated which promises are associated with the use of AI in the smart grid, with the focus on the integration of renewable energies. For the mobility sector, we investigated the role attributed to AI-based autonomous and connected driving in the context of the mobility transition, using the example of autonomous minibuses in rural areas. We find that AI futures envisioned for the energy sector have a clear orientation towards climate protection goals while those for (rural) mobility sector lack a clear orientation in this regard.

1 Introduction

Futures studies have shown how visions, expectations or imaginaries are shaping scientific and technological developments (van Lente and Rip 1998) and seek to manage complexity and uncertainty (Beckert 2016). The multiple and contested future visions

around artificial intelligence (AI) (Barais & Katzenbach 2022) provide rich insights into the role of distinct orientations towards the future (Beck et. Al 2021).

We show the narratively produced expectations of AI futures in the energy and mobility sector in Germany – two sectors that are associated with high expectations towards achieving climate protection goals (Federal Government of Germany 2022; Gossen, Rohde, und Santarius 2021; Yigitcanlar und Cugurullo 2020). AI futures in both sectors are still uncertain but voiced expectations around AI function as orientation towards the future and eventually determine what developments are considered relevant, urgent, possible or inevitable. Against this backdrop, our contribution is centred around two overarching research questions:

1. Which expectations towards the future are voiced by which actors concerning the use of AI in the energy and mobility sector?
2. How do respective narratives of AI futures envision solutions for sector-specific sustainability challenges?

The goal of the energy transition, i.e. the transformation of the energy system from fossil fuels and nuclear power to an energy system that is neutral in terms of greenhouse gas emissions, is for renewable energies to cover 80% of the gross electricity demand in Germany by 2030. A particular challenge in implementing the energy transition is that grid stability must be always ensured in the electricity system in order to avoid power outages. However, electricity from renewable sources fluctuates in generation depending on the weather (e.g. generation by wind or photovoltaic plants). At the same time, renewable energy plants are significantly smaller and spatially distributed in a much more decentralised manner compared to conventional power plants. An essential condition for the success of the energy transition and very high shares of renewable energies in the electricity mix is therefore to control the electricity grid more flexibly and intelligently (so-called 'smart grids'). Due to advances in the field of big data analysis through machine learning, many use cases in the energy sector have become possible or have expanded. AI applications are said to be useful for forecasting, demand-side management, maintenance, grid condition analysis, automated electricity trading or decentralised system services and thereby address challenges such as fluctuation and distribution of renewable energy (Ali & Choi 2020, Omitaomu & Niu 2021, Kumar et al. 2020, Zhang et al. 2018, Massaoudi et al. 2021, Hossain et al. 2019). It is argued that such smart grid technologies are solving some of the main challenges of integrating renewable energies into the electricity system (Appelrath 2013). For the investigation of AI futures in the energy sector, we therefore asked:

Which promises are raised by which actors with regard to the use of AI for the integration of renewable energies?

The mobility sector is responsible for about one fifth of greenhouse gas emissions in Germany (UBA 2022). To make its contribution to climate protection it is important to increase the share of climate-friendly modes of transport like public transport, bicycle and walking in the modal split. However, the provision of public transport services in rural areas in particular poses a major challenge, especially financially, due to sparse population, low usage and extensive service areas (Kling 2021). Digitally connected services make it easier for users to access sharing services and public transport and are seen as a driver of the mobility transition (Hofmann et al. 2020, Hennicke et al. 2021). While mobility offers within the concept of 'Mobility as a Service' represent a lucrative business field for the mobility industry in densely populated urban areas, rural regions remain economically unattractive. AI-supported mobility is seen as a way out. Autonomously driving and networked minibuses are expected to save labour costs and can be used flexibly to supplement mobility services in rural areas (Mörner & Boltze 2018, Sinner et al. 2017). The efficient and cost-effective provision of public transport services in sparsely populated areas should make it possible for more people to abandon their own cars (Hennicke et al. 2021). For the investigation of AI futures in the mobility sector, we therefore asked:

What expectations are associated with the use of AI with regard to sustainable mobility? How can autonomous minibuses in particular contribute to sustainable mobility in rural areas? With what objectives are autonomous minibuses being developed and which priority is given to the sustainable design of AI-supported mobility in rural areas?

2 Theoretical Framework

Envisioned or imagined futures can be understood as visions of a pretended future that are forcefully driving innovative activity (Beckert 2016). The prospective structures that those visions, expectations or imaginaries entail, are shaping scientific and technological developments (van Lente and Rip 1998; Konrad and Böhle 2019). Those envisioned futures open up space for action and seek to manage complexity and uncertainty (Beckert 2016; Engels and Münch 2015), set agendas, create relationships, define roles and influence the allocation of resources (Beckert 2016). Since these future visions are collectively shared, the explicit claims and implied framings they entail are shaping what developments are considered relevant and urgent, possible, or inevitable (Konrad and Böhle 2019). Imagined futures do not only mobilize diverse actors from different political and cultural backgrounds to move and invest in emerging technology fields (Borup et al. 2006) but may also "stir public debate on the desirability of what particular technologies might entail for society" (Konrad and Böhle 2019, p. 102). We understand visions of the

future as a society's, or social group's, distinctive orientation toward the future and "representations of how collectives want that world to be." (Beck et al. 2021, p. 147). The various concepts such as sociotechnical imaginaries (Jassanof & Kim 2015), visions (Dierkes et al. 1996; Wiek and Ivaniec 2014) or expectations (Borup et al. 2006) can be subsumed under the term socio-technical futures (Lösch et al. 2019).

We are interested in narratively produced expectations and how they are able to shape issue-based fields (Hoffman 1999). Van Lente and Rip, for example, explain the constitution of technological fields in terms of narratively produced attributions of expectations and the gradual formation of a shared agenda (van Lente & Rip 1998).

"Voicing expectations has been part and parcel of doing science and mobilizing resources through the ages. In fact, knowledge claims (generalizations of findings, up to the speculations found in the final sections of research papers) already voice expectations, in this case about the validity of the wider claims. And they are put forward to mobilize interest and, hopefully, reputation. Promises and expectations, including broad and interesting claims, are a way to get your audience to listen." (van Lente & Rip 1998, p. 223)

We refer to this approach and seek to identify which expectations can be observed and which promises are associated with the use of AI in the smart grid and the mobility sector. Instead of referring to technological fields, we refer to the concept of issue-based fields (Hoffmann 1999) i.e., fields that form around a central issue rather than a technology or market. We argue that this conceptualization is distinct from van Lente and Rips (1998) notion technological fields because it allows to capture the heterogeneity of actors, the competing interests and the divergent expectations voiced by different actor groups when it comes to AI. Consequently, we look at the voiced expectations that are raised by diverse actors within issue-based fields and how socio-technical futures on AI are articulated and negotiated within those fields. Furthermore, this framework is aimed to explain how the attribution of expectations and the mobilisation of resources are able to exert influence and thus have performative effects (Horst 2007) on such fields. With the increasing use of AI technologies in the energy and mobility sectors, new complexities are emerging, and new narratives are being developed. With our case studies, we want to elaborate these narratives and critically examine which expectations, aspirations and fears are articulated by different actors. Furthermore, we want to investigate which social, ecological and economic impacts are voiced by the actors in the AI-supported smart grid and mobility fields.

3 Methods

To capture expectations towards the use of AI systems in energy and mobility systems, we conducted embedded case studies (Yin 2009) for each sector. Due to differences between the two objects of research – e.g., considered AI systems, involved actors, and relevant policies – individual research designs were slightly geared towards each case. Both involve conceptual considerations as well as empirical research, tapping different sources of information and studying different units of analysis. For both the energy and mobility sector concrete cases of applying AI were explored as embedded in broader contexts, such as the broader European energy sector or the mobility sector in Germany. Both case studies were conducted throughout 2022. Our results and conclusions are mainly based on qualitative analyses.

For the **case study on the energy sector**, our analyses concern both the specific case of 'energy optimisation in a neighbourhood' itself as well as its context as units of analysis. The specific case is the attempt to realise 'intelligent' optimisation of energy supply in a delimited district, whereby the respective context consists in the use of AI technologies for the integration of renewable energies in general. The context consideration is important because we did not only want to survey concrete potentials and impacts in the neighbourhood, but also the promises, expectations and justification narratives formulated by different actors in the energy sector. The study design thereby aims to relate the transformational potential of AI-based renewable energy integration practices at neighbourhood level to an overall transformative goal in the energy sector.

The aim is to look at the promises, motives and goals associated with the use of AI for the integration of renewable energies as well as anticipated risks and dynamics in the actor constellation of the energy system. The analysis was carried out as from the perspectives of different actors in the field of smart grids (Rohde & Hielscher 2021). The overarching vision of smart grids is seen as an important path to enable demand side management and the de-peaking of energy demands through an enhanced electricity infrastructure equipped with information and communication technologies (Marris 2008). The use of AI for integrating renewable energies is conceptualised as an issue-based field (Hoffman 1999). This means that the issue-based field consists on the one hand of actors who look at the smart grid as outsiders or influence it through their own ideas (motives, goals, promises) and measures derived from them (politics, science, civil society). On the other hand, it consists of actors acting within the smart grid (e.g. energy suppliers, grid operators, ICT service providers, etc.).

Based on desktop and literature research reports, position papers and strategy papers as well as studies by various actor groups were collected that make statements on the

role of AI for the energy transition. The actor groups were identified on the basis of preliminary work on smart grids (Rohde & Hielscher 2021). Selected documents should address the use of AI in the energy transition and not have been published before 2017. The aim was not to include all existing publications in the sample, but to achieve a reasonable balance between the groups of actors. Nevertheless, civil society is underrepresented in the sample. This may be related to the search strategy, but also to the fact that civil society has a different, less technology-oriented focus when it comes to the energy transition. The sample consisted of 31 documents from the German, European and international context, distributed among the following actor groups:

- Science and research
- Energy industry (associations, energy company)
- Network operators
- Politics
- Civil society

Based on the documents, the promises and expectation narratives were identified as well as the addressed risks of the use of AI. The documents are regarded as communication material to intendedly communicate actions. By means of a structuring content analysis, the documents were coded with the evaluation software MaxQDA. Essential statements were filtered out of the documents and clustered using a predefined analysis grid, that was derived from the research questions and the theoretical frame and that was inductively refined throughout the coding and clustering process At the centre of the evaluation process was the systematic structuring of text material. The focus was on the qualitative interpretation of the data and quantifying evaluation procedures (e.g., frequencies of coded segments) were used as a support. After the document analysis, a total of five guided expert interviews lasting between 30 and 50 minutes were conducted in March and April 2022. The interviews were conducted with actors who are connected to the specific case of energy optimisation in an existing energy neighbourhood project. Additionally, actors who can be assigned to the larger context were interviewed. They were identified on the basis of the document analysis and a further internet search.

For the **case study on the mobility sector**, our analyses concerned the application of AI in autonomous vehicles, more specific the use of autonomous public transport minibuses in rural areas, as well as the context of transforming the mobility sector towards sustainability. Our research design related promises, expectations and justification narratives stated by economic, policy, and research actors to the context of transforming rural mobility towards sustainability, which is deemed to require attractive and inclusive supply of mobility options in public transport, cycling and walking. We aimed

to identify promises, motives and goals associated with the use of autonomous vehicles for sustainable mobility as well as for minibuses in rural areas in particular. By examining different development and pilot projects in German rural areas, we looked at the priority of sustainability design requirements in existing projects and the AI systems used in each case.

Expectations and promises were extracted from six different strategy papers from various federal states and supplementary desktop research. The analysed set of documents comprises all publicly available political strategies from federal states in Germany addressing digital technologies and/or transitions in the mobility sector. Our document analysis includes:

- Public Transport Strategy Baden-Wuerttemberg 2030 (VM BW, 2022)
- Digitalisation Strategy Baden-Wuerttemberg (IM BW, 2022)
- Digital Programme Brandenburg 2025 (Landesregierung Brandenburg, 2017)
- Hesse Strategy Mobility 2035 (HMWEVW, 2018)
- State Transport Plan Mecklenburg-Western Pomerania (EM MV, 2018)
- State Transport Plan Saxony 2030 (SMWA, 2019)

In addition to the political strategy papers, we evaluated self-descriptions and publicly available information about projects dealing with autonomous buses in rural areas. The projects were derived from an online overview of autonomous buses in Germany, that is compiled by the Association of German Transport Companies (VDV). It lists 61 projects in which autonomous buses are used or tested in public transport. We spoke to staff members of four of those projects in different German regions, that aim at implementing autonomous buses in rural areas. Five interviews were conducted in October, November and December 2022 and lasted between 45 and 55 minutes, each involving between one and three interviewees. Three of them involved several persons. We used a semi-structured interview guideline to capture information for a qualitative analysis.

In a **cross-case analysis** (Babbie 2016:383) we explored common patterns of narratively justifying the use of AI in both case studies. Taking a case-oriented approach, we looked first at respective frequencies of mentioned expectations, limitations, visions, goals and uses for sustainability in both the energy and the mobility setting. Subsequently, we derived thematic clusters for both case studies and compared them across both case studies with a similar technique. However, in this second step, our analytical focus was more on the deduction of possible mechanisms and underlying logics behind the identified narratives. As described above, document analyses, interviews studies and analyses of publicly available information on real-world AI-

involving projects served as data sources for the cross-case analysis. This heterogeneously composited data base can, on the one hand, delimit comparability. On the other hand, it enriches the diversity of perspectives captured on each embedded case. Another limitation of our method is set in the relatively low number of investigated instances. Recorded data is not exhaustive nor generalisable, however, it can serve for insightful explorative qualitative analysis to deduct general patterns in emerging sociotechnical imaginaries transported in the field of AI.

4 Findings

Energy

We identified three dominant narratives that relate to the promises and justifications of the use of AI in the smart grid:

1. AI advances the energy transition by enabling the integration of renewable energies, for it deals or will deal with complexity, improve the security of supply and system stability and enhances acceptance and participation in the energy transition.
2. AI increases efficiency and enables process optimisation and cost reduction.
3. The use of AI in the energy sector will lead to economic advantages by lowering costs and increasing revenues.

The main actors pushing these narratives are politics, science and the energy industry. In the first narrative, politics is the dominant actor, while the industry promotes the second and third narratives the most.

While these narratives frame the future of AI in the energy sectors as chances and opportunities, risks play a subordinate role. For example, the expected AI enabled efficiency and process optimisation in the energy system are mentioned in a total of 86 occasions in our empirical material, risks are only mentioned in a total of 20 occasions. The risks most frequently mentioned in the documents and the interviews are cybersecurity and the energy and resource consumption of the infrastructure.

Additional aspects that have been raised in the interviews were, *first*, the ambivalence of using AI in the energy sector. One interviewee pointed out that while AI is supposed to deal with the complexity of the energy system it also adds another layer that enhances the complexity of the system and makes it harder to control its safety. *Second*, in another interview the lack of data as a barrier to the actual implementation of AI, especially for small players in the energy sector was addressed. According to the interviewee it can already be observed that actors move at different paces concerning the implementation of AI. Actors who have been digitalizing their processes in the past are the ones profiting

the most from AI now. Others who did not have the capacity, capital or know how to do so, might get lost on the way. In the long run, this might be a hinderance for the energy transition as a whole, as multiple actor groups are needed for it. *Third*, asked for the biggest barriers to overcome for the energy transitions, some interviewees referred to problems that cannot or are currently not addressed by the implementation of AI. These are the need for built infrastructure (e.g. renewable energy plants and storages) as well as issues with legislation and the licensing of renewable energy plants such as solar panels or wind turbines.

Mobility

Our document analysis showed that AI futures in the mobility sector are, if at all, only loosely and vaguely connected to visions for sustainable mobility in rural areas. In some cases, high expectations are expressed for autonomous driving technology. As an example, the digitalisation strategy of the state government of Baden-Wuerttemberg emphasises "numerous opportunities to make the mobility of tomorrow comfortable and sustainable. (IM BW, 2022: 46). In some places, autonomous local transport is seen as a "booster of the transport transition." (DB Regio, 2022: 5); one transport association even expects the "roboshuttle revolution" (VDV, 2022, p. 34). However, it is striking that more detailed descriptions and the concrete benefits, especially for sustainable transport, very often remain blurred.

Moreover, the analysed strategy papers reveal argumentative and strategic incoherencies, when it comes to relating the development of autonomous driving to rural challenges. Saxony's State Transport Plan, for example, emphasises that automated driving functions offer "starting points for providing appropriate mobility services, particularly against the background of demographic change and the development requirements of rural areas". (SMWA, 2019: 72). Sparsely populated regions are thus considered to be particularly suitable locations for AI-supported mobility applications. At the same time, the preparatory testing of such systems in Saxony has paradoxically so far been "concentrated in particular on test fields in urban areas" (ibid.).

More tangible than the expected contributions of AI to sustainable urban mobility is the (national and) federal intention to increase the attractiveness of industrial locations in German regions by implementing autonomous driving test fields or required infrastructures. The Lower Saxony Ministry of Economics, Labour, Transport and Digitalisation, for example, has reached various "agreements" with the automotive industry and two other sectors in the strategic development process for a "gigabit infrastructure" (internet connections with very high transmission rates). (MW NI, 2018: 36). One result is the conviction: "We need intelligent traffic control and autonomous driving" (ibid.).

However, as part of the strategy process, autonomous driving can in this case hardly function as a means, but rather as a legitimisation of the already set goal of a gigabit infrastructure.

The expectations voiced by staff members of projects implementing autonomous buses in rural areas are:

- More efficient clocking and coverage
- More efficient vehicle utilisation and operating and therefore cost reduction
- Increase Safety and comfort

The analysis of the information and self-descriptions of the 61 projects in which autonomous buses are used in local public transport somehow mirrors the findings of the document analysis. Only 16 of these projects are located in rural areas. Of the 16 projects in rural areas, nine deal specifically with typical rural challenges of the mobility transition. The accessibility of mobility offers due to the low-cost provision of automated passenger transport is emphasised several times. But: only 3 of the projects explicitly examine the economic efficiency of operating autonomous buses. Only one project focuses on the greatest leverage for the reduction of greenhouse gases in the transport sector by investigating the potential of autonomous minibuses to reduce private motorised transport. The focus of the analysed projects is on acceptance among the population and further technical development.

In summary, the greatest hopes for AI-supported rural public transport lie in new transport and business models that integrate (small) automated buses into existing services and thus create additional options for public transport. Autonomous vehicles are not intended to replace conventional public transport systems, but to complement them. There are no strong indications that public autonomous vehicles are supposed to replace private motorised transport. Inherent in the concept is the elimination of the need for drivers for the new vehicles. Transport companies hope to minimise a significant cost factor for the operation of their fleets. It is not yet possible to quantify the corresponding savings, as there is no experience with which to estimate the additional costs for the required control centres.

5   Conclusions and discussion

In conclusion we find that envisioned AI futures for both sectors differ with regard to how they envision solutions for sector-specific sustainability challenges. In the energy sector AI is expected to enable renewable energy integration by dealing with complexity, improving the security of supply and system stability and enhancing acceptance and participation in the energy transition. Therefore, AI futures envisioned for the energy sector have a clear orientation towards sustainability. In the mobility sector, by contrast, AI's expected contribution to climate protection remain vague, the rural area is addressed as area of action, but it is rarely expected that AI enabled autonomous driving will help to shift the modal split. Therefore, AI futures envisioned for the mobility sector lack a clear orientation towards sustainability.

Furthermore, envisioned AI futures for the energy sector reveal a strong focus on chances, while potential (sustainability) risks are underrepresented. Also, ambivalent developments are tuned out for the sake of strong narratives: e.g. the quest to reduce complexity versus increasing system complexity by integrating AI in energy system or the vision of a democratic and decentralized energy transition versus Big Data as basis for AI-enabled renewable energy integration that brings advantage only for players with access to Big Data. With their narratives actors promote AI as a solution to urgent societal challenges, e.g. climate change and these voiced expectations promote a convergence of AI and sustainability visions. As such climate protection also functions as a legitimization for AI implementation in the energy sector, which has also been found in other areas of 'smart energy' developments (Rohde & Santarius 2023). In contrast, the consideration of opportunities and risks of AI in the mobility sector regarding sustainability does not play a role. One possible explanation is that the application in the mobility sector takes place without a clear reference to sustainability anyway. Thus, no reflections of opportunities and risks for sustainability take place.

The envisioned AI futures for the mobility sector reveal that the implementation of AI enabled autonomous driving technologies currently only aim at incremental change instead of the mobility transition. The focus is rather put on strengthening automotive industry. This corresponds with research findings on user preferences over different urban transport options (Acheampong et al. 2021), that showed that there will probably be no reduction of private motorized vehicles with autonomous driving technologies in place. The focus on incremental change in the mobility sector may be specifically German because "*incumbent companies such as the German car manufacturers Daimler and Volkswagen are usually not interested in radical change due to sunk investments*" (Graf & Sonnberger 2020).   Finally, our findings invoke the question of whether the lack of vision for enabling a modal shift with the use of AI stems from the fact that there might

be no technical fix for the mobility transitions. Consequently, it must be asked: If AI does not contribute to this sustainability challenge, is the use of AI in the mobility sector appropriate at all?

When it comes to futures studies our case studies reveal, that analyzing voiced expectations about AI in the energy and mobility sector enable us to reveal how certain actors are pursuing their own agendas while concealing problematic developments or driving incomplete solutions (Sovacool et al., 2020). One of our key insights illustrates that autonomous driving solutions, are rarely addressing the most pressing challenges of a transition of the mobility sector towards sustainability but are heralded as a techno-reductionist solution that is being put into practice not only in Germany but also in projects across the world (Latz et al. 2022). As such, the voiced expectations that emerge around AI are performative (Rudek 2022), because they might be foreclosing alternative pathways, for transforming rural mobility systems. Thereby these expectations can also serve as instruments of legitimation and mask political interests and power constellations that are forcefully driving innovative activities. The question arises of where the societal negotiation should take place to weigh up advantages and risks of AI centered solutions and critically interrogate the somewhat fuzzy, implicit, broadly accepted and culturally embedded understandings of the 'good life' or the 'good future' (Jasanoff an Kim 2015) that those AI futures entail.

References

Acheampong, R. A., Cugurullo, F., Gueriau, M., & Dusparic, I. (2021). Can autonomous vehicles enable sustainable mobility in future cities? Insights and policy challenges from user preferences over different urban transport options. Cities, 112, 103134.

Ali, S. S., & Choi, B. J. (2020). State-of-the-art artificial intelligence techniques for distributed smart grids: A review. Electronics, 9(6), 1030.

Babbie, E. (2016). The Practice of Social Research. 14th edn. Boston, MA: Cengage Learning.

Bareis, J., & Katzenbach, C. (2022). Talking AI into being: The narratives and imaginaries of national AI strategies and their performative politics. Science, Technology, & Human Values, 47(5), 855-881.

Beck, S., Jasanoff, S., Stirling, A., & Polzin, C. (2021). The governance of sociotechnical transformations to sustainability. Current Opinion in Environmental Sustainability, 49, 143-152.

Beckert, J. (2016). Imagined futures: Fictional expectations and capitalist dynamics. Harvard University Press.https://doi.org/10.1016/j.futures.2019.03.003

Borup, M., Brown, N., Konrad, K., & Van Lente, H. (2006). The sociology of expectations in science and technology. Technology analysis & strategic management, 18(3-4), 285-298.

Brandt, P., Ernst, A., Gralla, F., Luederitz, C., Lang, D. J., Newig, J., Reinert, F., Abson, D. J. & H. von Wehrden (2013). „A review of transdisciplinary research in sustainability science". Ecological Economics 92, 1–15.

Crawford, K., & V. Joler (2018). „Anatomy of an AI System".

DB Regio (2022). „Transformation der öffentlichen Straße - eine integrierte, autonome Antwort". https://www1.deutschebahn.com/resource/blob/7726064/5eaaf50a14b636 36c7d0674ca06fa625/6-VDV-Zukunftskongress-Autonomes-Fahren-im-Oeffentlichen-Verkehr-data.pdf.

EM MV (2018). „Integrierter Landesverkehrsplan Mecklenburg-Vorpommern". Ministerium für Energie, Infrastruktur und Digitalisierung Mecklenburg-Vorpommern. https://www.regierung-mv.de/serviceassistent/download?id=1606310.

Engels, F., & Münch, A. V. (2015). The micro smart grid as a materialised imaginary within the German energy transition. Energy Research & Social Science, 9, 35-42.

Federal Government of Germany (2022). „Digital Strategy - Creating Digital Values Together (Translation)".

Fligstein, N. & D. McAdam (2011). „Toward a General Theory of Strategic Action Fields". Sociological Theory 29(1), 1–26. doi: 10.1111/j.1467-9558.2010.01385.x.

Gossen, M., Rohde, F. & T. Santarius (2021). „A Marriage Story of Digitalisation and Sustainability?" Ökologisches Wirtschaften - Fachzeitschrift 36(O1), 4–8. doi: 10.14512/OEWO36014.

Graf, A. & M. Sonnenberger (2020). Responsibility, rationality, and acceptance: how future users of autonomous driving are constructed in stakeholders' sociotechnical imaginaries. Public Understanding of Science, 29(1), 61-75

Hennicke, P., Koska, T., Rasch, J., Reutter, O., & D. Seifried (2021). Nachhaltige Mobilität für alle. Ein Plädoyer für mehr Verkehrsgerechtigkeit. Oekom, München.

HMWEVW (2018). „Hessenstrategie Mobilität 2035". Hessisches Ministerium für Wirtschaft, Energie, Verkehr und Landesentwicklung. https://www.mobileshessen2030.de/mm/105_55_Hessenstrategie_Mobilitat_2035_online.pdf.

Hofmann, K. M., Hanesch, S., Levin-Keitel, M., Krummheuer, F., Serbser, W. H., Teille, K., & Wust, C. (2021). Auswirkungen von Digitalisierung auf persönliche Mobilität und vernetzte Räume–Zusammenfassende Betrachtung der Unseens digitaler Mobilität. DiDaT Weißbuch: 69-96. Nomos Verlagsgesellschaft mbH & Co. KG.

Horst, M. (2007). Public expectations of gene therapy: Scientific futures and their performative effects on scientific citizenship. Science, Technology, & Human Values, 32(2), 150-171.

Hossain, E., Khan, I., Un-Noor, F., Sikander, S. S., & Sunny, M. S. H. (2019). Application of big data and machine learning in smart grid, and associated security concerns: A review. Ieee Access, 7, 13960-13988.

IM BW (2022). „Für Alle Digital - Digitalisierungsstrategie der Landesregierung Baden-Württemberg". Ministerium des Inneren, für Digitalisierung und Kommunen Baden-Württemberg. https://digital-laend.de/wp-content/uploads/2022/10/Digitalisierungsstrategie-digital.LAEND-Oktober-2022-1.pdf.

Klinge, A. (2021, Nov. 18). „Ländliche Mobilität". Bundeszentrale für politische Bildung. https://www.bpb.de/themen/stadt-land/laendliche-raeume/335912/laendliche-mobilitaet/.

Konrad, K., & Böhle, K. (2019). Socio-technical futures and the governance of innovation processes—An introduction to the special issue. Futures, 109, 101-107.

Kumar, N. M., Chand, A. A., Malvoni, M., Prasad, K. A., Mamun, K. A., Islam, F. R., & Chopra, S. S. (2020). Distributed energy resources and the application of AI, IoT, and blockchain in smart grids. Energies, 13(21), 5739.

Landesregierung Brandenburg (2017). „Digitalprogramm des Landes Brandenburg – Digital. Vernetzt. Gemeinsam". https://digitalesbb.de/wp-content/uploads/2022/07/Digitalprogramm_BB_2025_Online-BF.pdf.

Latz, C., Vasileva, V., & Wimmer, M. A. (2022, August). Supporting Smart Mobility in Smart Cities Through Autonomous Driving Buses: A Comparative Analysis. In International Conference on Electronic Government (pp. 479-496). Cham: Springer International Publishing.

Lösch, A., Grunwald, A., Meister, M., & Schulz-Schaeffer, I. (Eds.). (2019). Socio-technical futures shaping the present: Empirical examples and analytical challenges. Springer Nature.

Marris, E. (2008). Upgrading the grid: Electricity grids must cope with rising demand and complexity in a changing world. Nature, 454(7204), 570-574.

Massaoudi, M., Abu-Rub, H., Refaat, S. S., Chihi, I., & Oueslati, F. S. (2021). Deep learning in smart grid technology: A review of recent advancements and future prospects. IEEE Access, 9, 54558-54578.

MW NI (2018). „Die Strategie Niedersachsens zur digitalen Transformation – Masterplan Digitalisierung". Niedersächsisches Ministerium für Wirtschaft, Arbeit, Verkehr und Digitalisierung. https://www.niedersachsen.de/download/135219/Masterplan_Digitalisierung_Die_Strategie_Niedersachsens_zur_digitalen_Transformation.pdf.

Omitaomu, O. A., & Niu, H. (2021). Artificial Intelligence Techniques in Smart Grid: A Survey. Smart Cities, 4(2), 548-568.

Rohde, F., & Hielscher, S. (2021). Smart grids and institutional change: Emerging contestations between organisations over smart energy transitions. Energy Research & Social Science, 74, 101974.

Rohde, F., & Santarius, T. (2023). Emerging sociotechnical imaginaries–How the smart home is legitimised in visions from industry, users in homes and policymakers in Germany. Futures, 103194.

Rudek, T. J. (2022). Capturing the invisible. Sociotechnical imaginaries of energy. The critical overview. Science and Public Policy, 49(2), 219-245.

Sinner, M.; Brawand, S. & U. Weidmann (2017). Große Chancen durch Automatisierung im ÖPNV. In: DER NAHVERKEHR 10, 30–36.

SMWA (2019). „Mobilität für Sachsen – Landesverkehrsplan 2030". Sächsisches Staatsministerium für Wirtschaft, Arbeit und Verkehr. https://publikationen.sachsen.de/bdb/artikel/33981/documents/52382.

Sovacool, B. K., & D. J. Hess (2017). „Ordering theories: Typologies and conceptual frameworks for sociotechnical change". Social Studies of Science 47(5), 703–50.

Umweltbundesamt (2020, Mar 15): Treibhausgasemissionen stiegen 2021 um 4,5 Prozent Bundesklimaschutzministerium kündigt umfangreiches Sofortprogramm an. Umweltbundesamt. https://www.umweltbundesamt.de/presse/pressemitteilungen/treibhausgasemissionen-stiegen-2021-um-45-prozent

Van Lente, H., & Rip, A. (1998). Expectations in technological developments: an example of prospective structures to be filled in by agency. De Gruyter Studies in Organization, 203-230.

VDV (2022). „Autonome Shuttle-Bus-Projekte in Deutschland". Autonome Busse in Deutschland: Liste & Details der Projekte | VDV - Die Verkehrsunternehmen. https://www.vdv.de/liste-autonome-shuttle-bus-projekte.aspx.

VDV (2022) Jahresbericht 2021/2022. Köln: Verband Deutscher Verkehrsunternehmen e.V. https://www.vdv.de/vdv-jahresbericht-2021-2022.pdfx.

VM BW (2022). „ÖPNV-Strategie 2030 - Gemeinsam die Fahrgastzahlen im ÖPNV verdoppeln". Ministerium für Verkehr Baden-Württemberg. https://vm.baden-wuerttemberg.de/de/service/publikation/did/oepnv-strategie-2030-broschuere/.

von Mörner, M., & Boltze, M. (2018). Sammelverkehr mit autonomen Fahrzeugen im ländlichen Raum: Zur Zukunft des ÖPNV in dünn besiedelten Gebieten. NAHVERKEHR, 36(11).

A. Wiek, D. Iwaniec, Quality criteria for visions and visioning in sustainability science, Sustain. Sci. 9 (4) (2014) 497–512, http://dx.doi.org/10.1007/s11625013-0208-6.

Yigitcanlar, T. & F. Cugurullo (2020). „The Sustainability of Artificial Intelligence: An Urbanistic Viewpoint from the Lens of Smart and Sustainable Cities". Sustainability (Switzerland) 12(20), 1–24. doi: 10.3390/su12208548.

Yin, Robert K. (2009). Case Study Research: Design and Methods. Bd. 5. SAGE.

Zhang, D., Han, X., & Deng, C. (2018). Review on the research and practice of deep learning and reinforcement learning in smart grids. CSEE Journal of Power and Energy Systems, 4(3), 362-370.

Thematic Field C:

Towards Low-Carbon Energy Systems and Fighting Climate Change

Kincentric Ecology and the Energy Transition; Achieving Net Zero Carbon Suggests Mainstreaming Nature Connectedness

D.R. Walwyn[1]

[1]Department of Engineering and Technology Management, University of Pretoria, , South Africa.

Abstract. The implementation of low carbon energy systems is of utmost importance to maintaining stable ecosystems and avoiding extreme climate change. However, many countries are failing to meet their emissions targets, global emissions of carbon dioxide have reached record levels and there is little evidence that the multiple 'climate action' resolutions are having any impact. The main proposition of this paper is that a partial cause of the environmental crisis is the construction of the human/nature or nature/society dualism. Alternatives to this dualism, broadly categorized as kincentricity, have existed historically, including *Ukama*, *Sumak kawsa*, *Pachamama* and *iwı́gara*, and are common to many indigenous cultures. These historical antecedents are reviewed and arranged according to a typology based on secular/spiritual vs. anthropocentric/ ecocentric. It is argued that the adoption of new meta-rule which reshapes the nature/society relationship and places kincentricity as a normative perspective through which future decisions on energy technologies and systems will be made, can play an important role in breaking the present destructive trajectory of the energy sector. The attainment of net zero carbon is not ultimately a technological change, it is a value-based transformation that invites the mainstreaming of kincentric ecology. The paper concludes with suggestions for further research, including the development of kincentricity indicators, and pedagogies for raising awareness of nature connectedness through the process of naturing.

1 Introduction

The climate crisis needs no introduction. Despite speeches upon speeches, reports upon reports, articles upon articles, levels of carbon dioxide continue to rise and the likelihood of reaching the 1.5°C target is becoming increasingly remote (Friedlingstein, Jones, O'Sullivan, Andrew, Bakker, Hauck, Le Quéré, Peters, Peters and Pongratz, 2022; United Nations Environment Programme, 2022). The persistent nature of the crisis suggests an alternative strategy, or at least a combination of strategies, both new and old, for the decarbonization of anthropogenic activity on the planet.

In this paper, the adoption of kincentricity in the form of a meta-rule, conceptualised as a broader version of kincentric ecology present across all of society, is proposed and discussed as a vital strategy for transformative change. Kincentric ecology as an alternative approach to shaping the relationship between humans and the environment is not new. Indeed, various configurations have been in place within indigenous cultures, covering a broad spectrum of practice and understanding, from spiritual to cultural and material (Salmón, 2000). These ontologies share a common feature, namely that nature must be treated with reverence and respect, it must be protected and preserved rather than exploited and harmed, a relationship which could be described as "environment as family" (Salmón, 2000).

Kincentricity as an axis for transformative change could be criticised as naïve and ignorant of a present context in which much of the world's human population is already living in cities under circumstances that are almost completely divorced or alienated from nature. Similarly, the proposition that effective change will be possible through an awareness of the dualism and its replacement in educational curricula with kincentricity (Salmon, 2015), is equally devoid of historical precedence and an understanding of power relationships within society. Eco-feminists, for instance, argue that it is patriarchy, which prioritises dominance, control, and exploitation, that has led simultaneously to nature's destruction and the oppression of women (Salleh, 2017). The solution to the climate crisis is to challenge patriarchy, and its intrinsic relationships of power, through political mobilisation and the reform of capitalism (Fraser, 2022).

However, the arguments in this paper for change through meta-rules are not alone in the literature. Similar arguments are presented in the articulation of the concepts of 'Deep Transition' (Kanger and Schot, 2019; Schot and Kanger, 2018), Ukama (Swilling, 2019 pp 35 - 72) and metatheory 2.0 (Marshall, 2015). Kincentricity, as discussed in the paper, is one possible 'foundational meta-rule'. The paper begins with a review of the relevant literature, including the origin of the human/nature dualism, historical antecedents to kincentricity, and alternative perspectives on meta-rules for transformative change. The different perspectives and theories are then combined into a single framework which uses a two-dimensional typology based on anthropocentricity and secularity. Finally, the paper details how the human/nature relationship could be re-imagined and what this way of seeing/knowing would mean for the design/decarbonisation of energy systems.

2 Overview of Human/Nature Framings

2.1 Dualism and Its Origins

The human/nature dualism is the philosophical concept that separates humans and nature as two distinct entities. This dualism implies that humans are not a part of nature but rather exist outside of it .

According to this dualistic view, humans are seen as rational beings with free will, consciousness, and the ability to control and manipulate the environment around them. On the other hand, nature is often portrayed as irrational, chaotic, and driven by instinct rather than reason. Nature is also seen as something that humans must control or conquer, rather than coexist with and respect.

This dualistic thinking has influenced many aspects of human culture and society, from the way we view ourselves and our place in the world to the way we interact with the environment. It has led to a belief that humans are superior to nature, and that nature exists only to serve human needs and desires.

However, this dualistic view has been challenged in recent years, as the interconnectedness and interdependence of humans and the environment have become more apparent. Many people now recognize the importance of working with nature rather than against it, and of recognizing that humans are a part of the natural world, rather than separate from it.

The origins of the human/nature dualism can be traced back to ancient Greek philosophy, particularly the works of Plato and Aristotle. Plato believed that the material world was inferior to the world of forms, which existed outside of space and time. He viewed the human soul as being separate from the body and the physical world and saw the physical world as an imperfect copy of the ideal world.

Aristotle, on the other hand, saw nature as a rational and purposeful system, but believed that humans were capable of transcending nature through their capacity for reason and virtue. He viewed nature as a resource to be used for human benefit, rather than something to be respected and protected.

This dualistic view was further developed during the Enlightenment, as scientific and technological advancements gave humans greater control over the natural world. The Enlightenment philosopher René Descartes famously separated the mind and body,

arguing that the mind was distinct from the physical body and could exist independently of it. This Cartesian dualism laid the foundation for the modern scientific worldview, which sees the natural world as a machine to be understood and controlled through reason and experimentation.

In summary, the human/nature dualism has its roots in ancient Greek philosophy and has been shaped and reinforced by cultural, scientific, and philosophical developments throughout history. Some of these cultural developments are now described.

2.2 Alternative Cultural Conceptualisations of the Human/Nature Relationship

2.2.1 Pachamama and Sumak Kawsay

The expression 'Pachamama' is used by the indigenous people of the Andes region in South America, particularly in the Quechua and Aymara cultures. It refers to the goddess or spirit of Mother Earth, who is believed to be the creator of all life and the source of all sustenance. In the Quechua language, "pacha" means "earth" or "world," while "mama" means "mother." Pachamama is thus seen as a maternal figure who nurtures and sustains all living beings on the planet, including humans, animals, and plants. She is also associated with fertility, agriculture, and the natural cycles of life and death (Stancioli, 2021).

Pachamama is honoured in various rituals and ceremonies throughout the Andean region, including offerings of coca leaves, corn, and other crops. These offerings are made to show gratitude for the blessings of nature and to ask for protection and guidance from Pachamama. More recently, the concept of Pachamama has gained broader recognition and is often used in environmental and ecological contexts to promote sustainable living and respect for the natural world (Humphreys, 2017).

The Quechua also use another expression, 'Sumak Kawsay', which can be translated as "Good Living" or "Living Well," but its meaning goes beyond simply living a good life. Sumak Kawsay is a concept that encompasses a holistic and sustainable way of life that is based on the harmonious relationship between human beings, nature, and the spiritual world. It recognizes that all living beings have inherent value and that their well-being is interconnected (Radcliffe, 2012).

This concept emphasizes the importance of community and collective well-being, rather than individualism and materialism. It also prioritizes the preservation of natural resources and the protection of the environment for future generations. Sumak Kawsay has gained recognition as an alternative development model that challenges the dominant paradigm of economic growth and consumerism. It has been incorporated into the constitutions of

several Andean countries, including Ecuador and Bolivia, as a guiding principle for public policy and decision-making.

2.2.2 Notions of Well-Being and Interconnectedness

The most fundamental claim of nature connectedness is that it is good for the planet and also for ourselves. To quote from the landscape artist Andy Goldsworthy (The Art Story, 2023)

> *"We often forget that we are nature. Nature is not something separate from us. So when we say that we have lost our connection to nature, we've lost our connection to ourselves."*

There are multiple references to nature connectedness and interconnectedness as a source of emotional and mental well-being throughout the literature (Pritchard, Richardson, Sheffield and McEwan, 2020). For instance, an important claim of environmental psychology is that identity is intimately connected to place or environment, and that the benefits of situatedness are heightened in a context that is close to nature (Burns, 2005). A growing alienation between individuals and the natural world has led to the higher levels of mental health and stress within society, and that the re-establishment of nature connectedness, as measured by the connectedness to nature scale, is essential to the recovery of human well-being (Mayer and Frantz, 2004).

A more detailed review of the work on the human benefits of nature connectedness is beyond the scope of this paper. Although important, its focus is primarily anthropocentric, with the main question being how closeness can improve human health, whereas the objective of my work is to understand how to improve prospects for the environment. Clearly, there is an interaction between the two sets of benefits (whether they accrue to people or directly to the environment), and if humanity can be persuaded that environmental conservation is important for its own survival, it will be a powerful incentive to protect ecosystem services. However, the rationale for protection should not be about services to humankind, it is about services *to* ecosystems (van de Water, Henley, Bates and Slotow, 2022).

2.2.3 Iwígara

Iwígara is a term used by the Rarámuri, a group of indigenous people living Sierra Madres of Chihuahua, Mexico. The term refers to the "total interconnectedness and integration of all life in the Sierra Madres, physical and spiritual" (Salmón, 2000 p1328), and forms the basis for the concept of kincentric ecology.

Kincentric ecology is an ecological perspective that emphasizes the interconnectedness of all living beings and their relationship with the environment. It places particular emphasis on the role of kinship in shaping human interactions with the natural world. According to kincentric ecology, humans are not separate from nature but are instead a part of it. This perspective recognizes that all living beings, including humans, are interdependent and that the well-being of one is intimately tied to the well-being of all. Kincentric ecology emphasizes the importance of respecting and maintaining the relationships between humans and the natural world, and recognizes the importance of understanding the ecological, social, and cultural contexts in which these relationships exist. At its core, it emphasizes the importance of building relationships based on mutual respect and reciprocity between humans and the natural world. It encourages people to view nature not as a resource to be exploited, but as a complex system of interrelated beings with which we share a common destiny.

2.2.4 Ukama and Kincentric Ecology

Ukama is a term that describes an ethic of the relatedness of all things. It originates from the Shona people of Zimbabwe, and defines the concept that a person obtains her humanness through a relationality with animate and inanimate forms, both past and present. To quote from (Murove, 2009 p28):

> *"An ethic (Ukama) that arises from a civilisation sensitised to relatedness among all can only be an ethic about relatedness. Thus, in African ethics, relatedness is not restricted to human relations but extends to the natural environment, the past, the present and the future. This relatedness blurs the distinction between humanity and nature, the living and the dead ..."*

Ukama is often linked to the analogous concept of Ubuntu or African humanism, which emphasises the importance of humanity towards others, and is rooted in the belief that the well-being of an individual is directly connected to the well-being of the community (Okaneme and Obioha, 2017). Ubuntu reflects the principle that all human beings are interconnected and that our actions should be guided by a sense of compassion, empathy, and respect for others.

However, Ukama goes beyond the Ubuntu ideas of relationality, since it includes the natural environment and the past. In this sense, Ukama is a secular construct which could be used to reshape the human/nature relationship, and particularly to instil greater respect for the natural world and live according to the principles of sustainability. An examples of its manifestation in African society, not necessarily relevant to present urbanised contexts, was a totemic system in which individuals took responsibility for the conservation of a specific species (Murove, 2005 p138). Similarly, African folktales included animals as characters, and humans were portrayed as part of nature, at times

a rather ignorant species which could learn a great deal from its environment, if only it had to humility and patience to listen and observe (Murove, 2005 p140)

Despite its obvious and profound consequences as an alternative to the distinctive individualism of modern capitalism, Ukama is relatively unknown and barely described in the literature. The earlier texts on African philosophy tended to focus on Ubuntu, which is a similar ethical concept but is restricted to the interrelatedness of people as opposed to nature connectedness (Okaneme and Obioha, 2017; Murove, 2005). It was only quite recently, following the doctoral work of Murove (2005), that the Shona concept of Ukama was noted and described within the academic philosophical and theological literature (Swilling, 2019; Le Grange, 2012; Murove, 2009).

Ukama and the concept of kincentric ecology, as introduced earlier in the paper, are closely related. The latter was defined in the literature some years ago (Salmón, 2000), but has not been widely adopted as an important step towards reframing human/nature relationships. In the Salmón (2000 p 1332) article, it is described as

> *"Kincentric ecology pertains to the manner in which indigenous people view themselves as part of an extended ecological family that shares ancestry and origins. It is an awareness that life in any environment is viable only when humans view the life surrounding them as kin."*

The overlap with Ukama is apparent from this definition. Both conceptualisations accord equal status to humans and all natural elements of an ecosystem, and urge humans to act with care and respect towards these systems. In this world view, the environment is not a resource to be exploited or harvested or destroyed, but a family of elements whose right to life are as important as human life and acknowledged as such in culture and behaviour.

In addition to these cultural framings of the human/nature relationship, which lie in opposition to the acceptance of dualism, are several more theoretical frameworks that propose alternative axes of change based on socio-political models. Some of these models are reviewed in the next section.

3 Pathways to Transformative Change

3.1 Eco-Feminism

Eco-feminism is a social and political movement that seeks to address the interconnected issues of gender inequality, environmental degradation, and social injustice (Gaard, 2015). At its core, eco-feminism recognizes that the domination and exploitation of nature and women are deeply interconnected, and that both must be addressed to create a

more just and sustainable world. Eco-feminists argue that traditional patriarchal values, which prioritize dominance, control, and exploitation, have contributed to the destruction of the natural world, and have marginalized and oppressed women and other marginalized groups (Salleh, 2017; Shiva and Mies, 2014; Haraway, 1991; Plumwood, 1986). They point out that the impact of environmental degradation disproportionately affects women and other vulnerable populations, who are often the most dependent on natural resources for their livelihoods and well-being (Siwila, 2014).

Eco-feminists advocate for a more holistic approach to environmental and social issues, one that acknowledges the interconnectedness of all life and recognizes the value of diversity, cooperation, and empathy (Brisson, 2017). They also emphasize the importance of women's leadership and empowerment, as well as the need for greater representation of women and marginalized communities in decision-making processes related to the environment and social justice (Burke and Stephens, 2017).

Overall, eco-feminism seeks to challenge the dominant power structures and cultural norms that perpetuate environmental and social injustices, and to create a more equitable and sustainable future for all. Eco-feminists recognize that the current economic system, which prioritizes domination and dualism over social and environmental well-being, is a major contributor to climate change and other environmental problems (Burke and Stephens, 2018; Brisson, 2017). To address the climate crisis, they advocate for a more holistic approach that considers the interconnectedness of all life and recognizes the importance of social justice and gender equality (Mellor, 2018 pp1-13). They emphasize the need for a just transition to a more sustainable and equitable economy that prioritizes the well-being of both people and the planet (Brisson, 2017).

Some specific strategies that eco-feminists may advocate include:

1. Supporting women's leadership and empowerment: Eco-feminists recognize that women are often disproportionately affected by climate change and environmental degradation, and that they have a critical role to play in addressing these issues (Allen, Lyons and Stephens, 2019). They advocate for supporting women's leadership and empowerment, as well as increasing representation of women in decision-making processes related to the environment and climate change.

2. Promoting local, sustainable agriculture: Eco-feminists recognize that industrial agriculture is a major contributor to climate change and other environmental problems. They advocate for promoting local, sustainable agriculture practices that prioritize soil health, biodiversity, and the well-being of farmers and communities (Radel, 2009).

3. Investing in renewable energy: Eco-feminists emphasize the need to transition to renewable energy sources, such as solar and wind power, to reduce reliance on fossil fuels and decrease greenhouse gas emissions (Gaard, 2017).

4. Reducing consumption and waste: Eco-feminists recognize that overconsumption and waste are major contributors to environmental degradation and climate change. They advocate for reducing consumption and waste through measures such as recycling, composting, and reducing the use of single-use products (Radel, 2009).

Overall, eco-feminists seek to address the climate crisis through a more holistic approach that considers the interconnectedness of social and environmental issues, and prioritizes social justice, gender equality, and sustainability (Brisson, 2017).

3.2 Metatheory for Planetary Prosperity

A metatheory is a theory which attempts to consolidate several individual theories into a single thesis. Post modernism has tended to avoid such agglomeration, principally on the basis that knowledge is context-specific and that generalisations inevitably lack validity and even destroy useful detail. Critical realists, on the other hand, argue that integrative thinking is not only valid, but necessary, especially as a means of sensemaking within an increasingly complex and diverse world, overburdened with new information and perspectives (Hedlund and Esbjörn-Hargens, 2023). Moreover, metatheories will be essential in dealing with the climate crisis and develop an integrative response that can avoid its existential consequences (Huggel, Bouwer, Juhola, Mechler, Muccione, Orlove and Wallimann-Helmer, 2022).

In his synthesis of various metatheories, and his description of complex integral realism, Swilling (2019 p44) defines nine themes which are present within the underlying metatheories and form the basis for a single Metatheory 2.0 which could be used as the basis for re-establishing a flourishing, as opposed to a poisoned, planet. The themes include the acceptance of a realist, complex adaptive systems perspective, a rejection of the epistemic fallacy (Bhaskar, 1997), an advocacy for interdisciplinary research and an acknowledgement of the importance of context.

The relevance of these themes to transformative change is principally as a 'way of seeing' and understanding, with some of the more applied or practical aspects still being developed. Possible applications include the development of relational post-capitalism based on the principles of non-equilibrium economics, a strategic-relational and collibratory approach to governance and the pathways to just transition (Swilling, 2019 p68). Some of these outcomes are also addressed within the Deep Transitions literature, which is discussed in the next section.

3.3 Deep Transition

The concept of 'Deep Transition' has been proposed as a theory of change based on socio-technical literature and perspectives (Kanger and Schot, 2019; Schot and Kanger, 2018). In this approach, the important components of the change process are actors, institutions (used in the social science meaning of rules, customs, culture and laws used to govern behaviour) and technology, which interact in a dynamic and unpredictable or non-equilibrium and together constitute a socio-technical system (Kanger and Schot, 2019).

The theory identifies and defines four levels of institutions, beginning with rules, which are "humanly devised constraints that structure human activity and lead to a regular pattern of practice", to meta-rules, regimes and meta-regimes (Kanger and Schot, 2019). A Deep Transition is a process which results in changes to all four levels of institutions, and particularly in a re-direction of rule-sets leading to a shared directionality (Kanger and Schot, 2019, Table 1). The process can take place sequentially, with the initial emergence of new rules, followed by their diffusion and alignment into rule-sets, then regimes and finally meta-regimes, where the latter are rule-sets adopted within multiple socio-technical systems.

The framework also applies a structural hierarchy, postulating that change takes place within three levels of socio-technical systems, where the latter are aligned with the levels as defined by the Multi-Level Perspective (MLP) (Geels, 2018), namely niche, regime and landscape. The Deep Transition is characterised as the adoption of new rule-sets within multiple regimes, leading at some point to profound transformation of the socio-technical landscape.

The structuration of Deep Transition theory and its conceptualisation of shared directionality are useful in understanding the proposed area of influence and transformation, as articulated in this paper. A revision of the framing of the human/nature relationship is at the level of a meta-rule, since it proposes kincentricity as a single rule (akin to a normative practice), operating across multiple socio-technical systems. Decisions on energy technologies or food production or systems of mobility or trade regulations would be subject to the same institutional rule or principle, namely that any decision must adopt as its starting point the objective of zero carbon emission or minimal environmental impact.

The discussion of the extent to which kincentricity could be incorporated into rule-sets for energy systems is taken further in Section 5 of this paper. In the next section, a typology of human/nature framings, which will be used in locating kincentricity as a secular and guiding principle for the Deep Transition, is presented.

4 Typology of Human/Nature Framings and Proposed Revision

In Section 2, a broad range of human/nature framings were introduced and discussed, and for each case, it was shown how these framings shape humanity's relationship with the natural world. Although interesting from an anthropological and historical perspective, not all the representations are appropriate as evidence-based arguments for the inclusion of kincentric ecology in science, technology and society studies, and particularly as a pre-condition for furthering the goals of sustainability and the attainment of net zero carbon emissions within the energy sector. The framings must now be characterised, arranged according to a typology and screened, so that only the most relevant can be put forward as valid for the objective of this paper.

Such a typology is now presented (see Figure 1). The system uses two property-based dimensions, arranged in a matrix format. The vertical axis considers the extent to which a specific framing is based on an anthropocentric ontology (view of the world) vs an ecocentric view, where the latter acknowledges that humankind is just one element of existence, and that a nature-centred perspective, in which all forms of existing, including inanimate elements, deserve equal status, should be adopted and practised. The horizontal axis reflects the degree of implied spiritually of a framing, such as whether nature is conceptualised as a 'Mother' or goddess and incorporated into religious belief or culture.
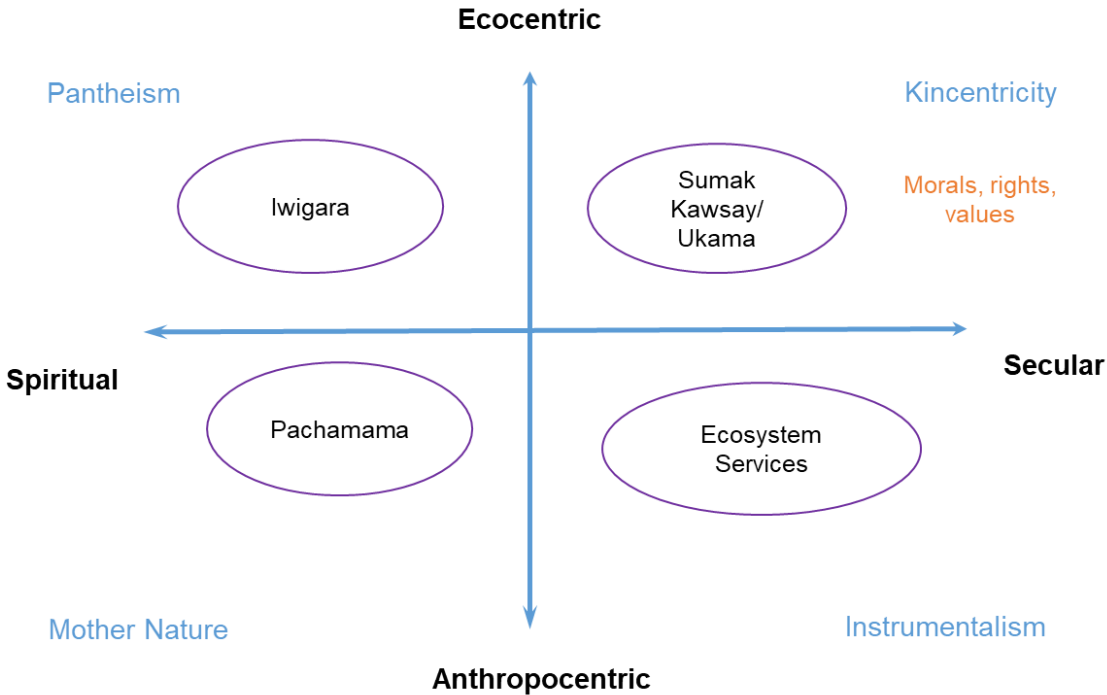
Figure 1: Typology of nature framings

The two axes demarcate four quadrants which are labelled 'Pantheism', 'Mother Nature', 'Instrumentalism' and 'Kincentricity', listed in anti-clockwise order beginning with the top left. Examples of beliefs and practices within each quadrant are also included in Figure 1. For instance, the secular/anthropocentric conceptualisation of the human/ nature relationship, broadly categorised as instrumentalism, values the environment only in respect of its ability to support human existence, such as the provision of food, medicines, mineral resources and even entertainment.

The spiritual quadrants will not form part of this analysis and discussion since these conceptualisations are essentially phenomenological and relate to belief systems. Moreover, although religious beliefs strongly influence individual behaviour and can be a powerful force for change, the potential for the capture of devotees by powerful institutions, and hence their subversion to serving the narrow interests of these institutions, rather than the pursuit of their spirituality, obviates against any consideration of these quadrants as a route to value-based transformation (Klocek and Hassner, 2019). Instead, this paper focuses on the secular quadrants, where the agents of change are the instruments of morals, rules, rights and meta-rules.

Moreover, treatment of the environment simply as a crucible of resources, to be extracted and used in the form of ecosystem services, is counter to the ideals of kincentricity. This contradiction rules out any consideration of the 'Instrumental' quadrant in Figure 1, leaving only the fourth quadrant, labelled as 'Kincentricity'.

The typology of Figure 1 is useful, then, in screening proposed human/nature framings as may be used in re-directing this critical relationship. It highlights that calls for the redefinition of the human/nature relationship have been made from various actors, including spiritual leaders, environmental groups, advocacy agencies and political leaders (Tymieniecka, 2013). Although the perspectives of 'Pantheism', 'Mother Nature' and 'Instrumentalism' may be valid in other contexts, within the cadre of literature relevant to sustainability transitions, I argue that only 'Kincentricity' is a valid approach, since it does not require conscription to religion or belief in the supernatural, or the assumption that nature only exists to serve human interests. In other words, the principle of kincentricity, which is a secular, ecocentric perspective of the human/nature relationship, is proposed as the most appropriate basis on which morals, rights, rules and principles could be reconstructed to achieve the necessary directionality, as outlined in the Deep Transition framework.

5 Linking Kincentric Ecology to Energy Transitions

5.1 Kincentricity as a Meta-Rule

This paper adopts an argument that is already well-documented in the literature, namely that an important cause of environmental destruction is the exploitative relationship between humans and nature. It also agrees with the perspective that changing this relationship requires a fundamental change to meta-values, as defined and explained within the theory of Deep Transition.

In the next step of the argument, the paper suggests that kincentricity could form the basis through which the human/nature relationship is reconstructed, and that this would lead to net zero for energy systems by providing a valuable compass through which such decisions are taken. As yet, there is no direct evidence to support this proposition or claim. Kincentricity could be, perhaps should be, adopted as a meta-rule, but whether this step will change the design of energy systems remains an important question.

In answering this question, it is noted that decisions on energy systems and energy futures are frequently taken by individuals, who act within their own ontological and axiological assumptions (Dubois, Sovacool, Aall, Nilsson, Barbier, Herrmann, Bruyère, Andersson, Skold and Nadaud, 2019). Moreover, meta-rules are both the product of individual actions and institutional structures, in the way suggested by Gidden's structuration theory (Whittington, 2010). It is therefore not unreasonable to suggest that kincentricity as a meta-rule could change over time the design of energy systems and hence their decarbonisation.

Surprisingly, the discussion on meta-regimes and meta-rules includes little detail as to what new rulesets are required or how they may emerge (Kanger and Schot, 2019). The literature argues for the imperative of such changes, but initiatives on transformative innovation policy are mostly at the experimental stage (Lundvall, 2022). The literature has focussed on the historical precedence and the present imperative for fundamental change. In this exploratory paper, it is argued that one element of the Deep Transition meta-rules could be kincentricity.

Such a proposition is now placed within a discursive space as a possible strategy. The idea is supported by similar claims, including the work of the eco-feminists and the meta-theorists, as reviewed in the earlier sections, which argues for a more holistic approach to environmental and social issues, one that acknowledges the interconnectedness of all life, as a means of overcoming environmental destruction and achieving equality.

Clearly, the beginning point for any reconstruction of the human/nature relationship is to abandon the dualism. It is apparent that this model has led to gross violations against nature, and the justification thereof (Jeffery, 2021). It is necessary to reshape the relationship as a socio-technical imaginary that conceptualises and treats 'nature as family', in accordance with the concept of kincentricity (Salmón, 2000). In the next section, I discuss how kincentricity as a meta-rule could be mainstreamed, and what implications such a decision would have for research and teaching.

5.2 Kincentricity as a Pathway to Net Zero

The most important step in mainstreaming kincentricity will be to validate the claim that kincentricity as a meta-rule will change human behaviour towards the environment and particularly in the design of energy systems. Without this evidence, the central argument of this paper remains speculation.

As part of this validation, two research areas are proposed, as detailed in the sections that follow.

5.2.1 Validation of Kincentricity and the Development of Indicators

Kincentricity refers to a form of the human/nature relationship in which nature is treated as family, and accorded the same status in terms of loyalty, respect, love and kinship. This definition is easy to visualise, but its practical application in the form of actualisation and behavioural change is more difficult. Previous studies have considered this problem, although only in the context of nature connectedness rather than kincentric ecology (Restall and Conrad, 2015). Such studies have explored questions such as how nature connectedness can be measured (Mayer and Frantz, 2004), whether environmental awareness is heightened by developing nature connectedness, and the extent of the link between a sense of well-being and the extent of nature connectedness (Schultz, 2002).

Similar questions still need to be answered for kincentricity, and the construct itself needs to be validated as a universal measure of the human/nature relationship. Is there a universal understanding of the term? Is there a measure of kincentricity which provides a reflection of its extent? Does the acceptance of kincentricity lead to a new world view in which respect and protection of nature becomes normative?

The phenomenon of therianthropes has been proposed as a possible measure of kincentricity (Walwyn, 2022a). Therianthropes are human/animal figures which have been variously interpreted depending on the ideological assemblages of the viewer, and these interpretations serve to surface the perspectives in a rather unsuspecting way. For instance, the earliest interpretations of such images in rock art from South Africa, the rock art historians have described these images as 'hunters dressed up as animals'

(Tongue, 1909). More recently, the images are considered to be the visualisations of shamans who have partially transformed into animals as a means of acquiring their potency (Ouzman, 2000).

In the author's own perspective, the images are a direct representation of nature connectedness. The merging of humans and other life forms in art is a depiction of the interconnectedness of species. Branches can become fish, tree trunks can be formed into sea lions, sticks into antelopes, and antelopes into humans (see Figure 2). Given this multiplicity of interpretations, all of which reflect a background set of ideological assumptions, it is conjectured that the interpretation of therianthropes could be used as a measure of kincentricity. Further research on the validation of this application is now required.


Figure 2: Therianthropes in San art

5.2.2 Pedagogies for Nature Connectedness

Previous work on the level of comprehension within a cohort of post-graduate students has shown that there is little shared understanding of the core concepts of Ukama, nature connectedness and interrelatedness (Walwyn, 2022b). The concepts are undeveloped, even within students who claim to lead nature-connected lives. This gap in understanding suggests that the adoption of kincentricity a normative perspective of the human/nature relationship will be difficult to accomplish without its inclusion in the curricula at all levels of the educational system, from early childhood education to universities and graduate colleges, and, indeed, within all discursive spaces.

Discursive spaces are locations and opportunities within which new ideas are introduced, debated and new knowledge is acquired. The extent to which such spaces 'work' depends on the discursive power or ability of the idea originator, and the cognitive flexibility of the recipients or students. The interplay between ability and flexibility as a formative mechanism is illustrated in Figure 3 (Walwyn, 2022b).

Although classrooms, lecture theatres and virtual teaching platforms are framed as discursive arenas in which students assemble with an open mind to learn new ideas and concepts, to acquire new knowledge and to be challenged in respect of their world views, in practice radical revision of their normative assumptions about the nature of the world is unlikely to take place. Teachings at this level need to take place from an early age, where personal ontologies are still being shaped and consolidated.
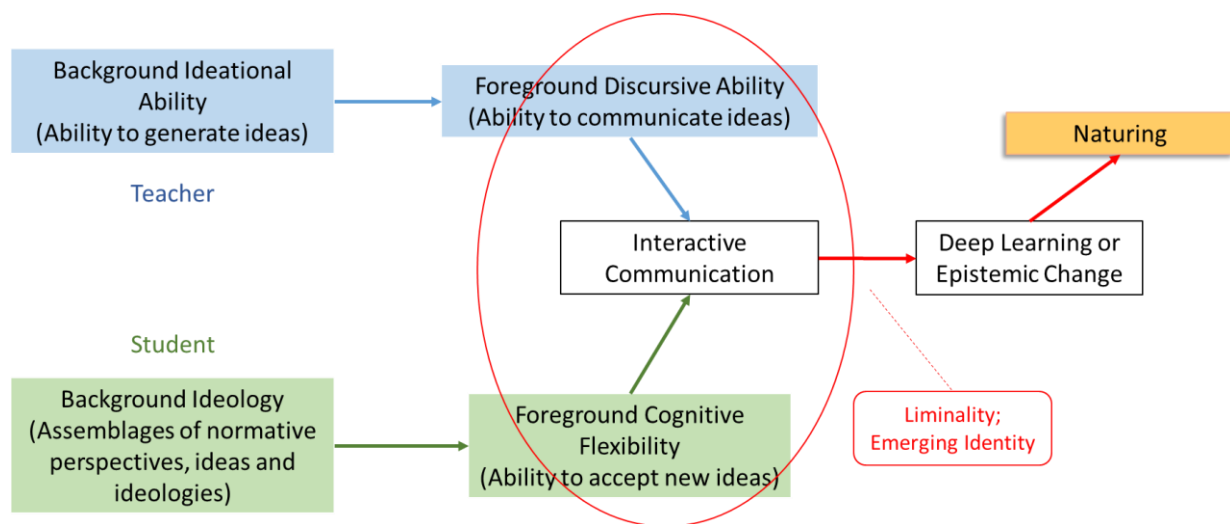
Figure 3: Discursive ability and cognitive flexibility

Borrowing from the language of gender studies, where gendering is used to refer to the process of socialisation according to the dominant gender norms (Butler, 2004), naturing is defined as the process which results in the development of kincentricity as the dominant form of the human/nature relationship. Such a strategy for embedding kincentricity as a meta-rule needs further exploration and research. What are the suitable pedagogies for communicating nature connectedness to young minds? How can kincentricity become a visceral experience as opposed to an abstract concept? How can naturing be both introduced and sustained within a new global culture?

Ultimately, a necessary outcome of naturing is that it becomes performative, that its adoption as a meta-rule results in changes to human behaviour. Further research on how naturing can lead to energy transitions is now required.

6 Conclusion

In summary, it is noted that this is a conceptual and exploratory paper which looks at how a reframing of the human/nature relationship could lead to net zero outcomes. The central proposition of this paper is that a major barrier to the sustainability transition of socio-technical systems is the persistence of a human/nature dualism, which rationalises and justifies the ongoing destruction of the environment in the pursuit of its resources. It is therefore proposed that an important pathway to transformative change, and by implication to the attainment of net zero or low carbon energy systems, would be the adoption of kincentricity as a fundamental meta-rule.

The concept of kincentricity, as a means of defining the human/nature relationship, is not new. It has existed in similar forms within indigenous cultures, including that of the Shona people in Zimbabwe, where it is articulated as Ukama. However, not all of these framings are considered to be applicable as a meta-rule for guiding the normative framework within which existing socio-technical systems, such as those for energy production, are changed, or new ones developed. The paper defines a new typology for human/nature framings and identifies a specific category of relationships which are considered to be relevant as a meta-rule.

The implications for further research of the formulation and adoption of kincentricity as a meta-rule, and how it could over time become part of meta-regimes, are also discussed in the paper. Two different areas of focus are suggested, namely validation of metrics for kincentricity and more effective pedagogies for nature connectedness.

Finally, it is acknowledged that sustained efforts, and eventual success, to implement sustainable energy generation and consumption will require, *inter alia*, economic, political, technological, and value-based strategies. The inclusion of kincentricity within this broader portfolio of theories, is presented as just one of multiple necessary initiatives and changes.

References

Allen, E., Lyons, H. & Stephens, J. C. (2019): Women's leadership in renewable transformation, energy justice and energy democracy: Redistributing power. Energy Research & Social Science, 57, pp 101233.

Bhaskar, R. (1997): On the ontological status of ideas. Journal for the theory of social behaviour, 27(2-3), pp 139-147.

Brisson, S. (2017): Women's Connectedness to Nature: An Ecofeminist Exploration. Honours, Regis University (Denver).

Burke, M. J. & Stephens, J. C. (2017): Energy democracy: Goals and policy instruments for sociotechnical transitions. Energy research & social science, 33, pp 35-48.

Burke, M. J. & Stephens, J. C. (2018): Political power and renewable energy futures: A critical review. Energy Research & Social Science, 35, pp 78-93.

Burns, G. W. (2005): Naturally happy, naturally healthy: The role of the natural environment in well-being. The science of well-being, pp 405-431.

Butler, J. (2004): Undoing Gender, New York: Routledge.

Dubois, G., Sovacool, B., Aall, C., Nilsson, M., Barbier, C., Herrmann, A., Bruyère, S., Andersson, C., Skold, B. & Nadaud, F. (2019): It starts at home? Climate policies targeting household consumption and behavioral decisions are key to low-carbon futures. Energy Research & Social Science, 52(6), pp 144-158.

Fraser, N. (2022): Cannibal Capitalism: How our System is Devouring Democracy, Care, and the Planetand What We Can Do About It, Verso Books.

Friedlingstein, P., Jones, M. W., O'Sullivan, M., Andrew, R. M., Bakker, D. C., Hauck, J., Le Quéré, C., Peters, G. P., Peters, W. & Pongratz, J. (2022): Global carbon budget 2021. Earth System Science Data, 14(4), pp 1917-2005.

Gaard, G. (2015): Published. Ecofeminism and climate change. Women's Studies International Forum. Elsevier, 49, pp 20-33.

Gaard, G. (2017): Critical Ecofeminism, Lexington Books.

Geels, F. W. (2018): Socio-Technical Transitions to Sustainability. In: Shugart, H. (Ed.) Oxford Research Encyclopedia of Environmental Science. Oxford: Oxford University Press, Ch 1, pp 1-37.

Haraway, D. J. (1991): A cyborg manifesto: Science, technology, and socialist-feminism in the late twentieth century. Simians, Cyborgs and Women: The Reinvention of Nature. New York: Routledge, Ch 4, pp 149-181.

Hedlund, N. & Esbjörn-Hargens, S. (2023): Introduction: From Metatheory to Metapraxis for Planetary Flourishing. Big Picture Perspectives on Planetary Flourishing. Routledge, Ch, pp 1-26.

Huggel, C., Bouwer, L. M., Juhola, S., Mechler, R., Muccione, V., Orlove, B. & Wallimann-Helmer, I. (2022): The existential risk space of climate change. Climatic Change, 174(1), pp 8. doi: 10.1007/s10584-022-03430-y

Humphreys, D. (2017): Rights of Pachamama: The emergence of an earth jurisprudence in the Americas. Journal of International Relations and Development, 20, pp 459-484.

Jeffery, T. C. (2021): Critical realist philosophy and the possibility of an eco-decolonial museology. Museum and Society, 19(1), pp 48-70.

Kanger, L. & Schot, J. (2019): Deep transitions: Theorizing the long-term patterns of socio-technical change. Environmental Innovation and Societal Transitions, 32, pp 7-21.

Klocek, J. & Hassner, R. E. (2019): War and religion: An overview. Oxford Research Encyclopedia of Politics, pp.

Le Grange, L. (2012): Ubuntu, ukama and the healing of nature, self and society. Educational philosophy and theory, 44(sup2), pp 56-67.

Lundvall, B.-Å. (2022): Transformative innovation policy–lessons from the innovation system literature. Innovation and Development, pp 1-18.

Marshall, P. (2015): Towards a complex integral realism. In: Roy Bhaskar, S. E.-H., Nicholas Hedlund, Mervyn Hartwig (Ed.) Metatheory for the Twenty-First Century. New York: Routledge, Ch 4, pp 172-214.

Mayer, F. S. & Frantz, C. M. (2004): The connectedness to nature scale: A measure of individuals' feeling in community with nature. Journal of Environmental Psychology, 24(4), pp 503-515.

Mellor, M. (2018): Feminism and ecology, John Wiley & Sons.

Murove, M. F. (2005): The Theory of Self-Interest in Modern Economic Discourse: A Critical Study in the Light of African Humanism and Process Philosophical Anthropology. PhD, University of South Africa (Pretoria). Available from https://uir.unisa.ac.za/handle/10500/629 (last accessed on 8 March 2023)

Murove, M. F. (2009): Beyond the savage evidence ethic: A vindication of African ethics. In: Murove, M. F. (Ed.) African Ethics: an Anthology for Comparative and Applied Ethics. Durban: University of KwaZulu-Natal Press, Ch, pp 14-32.

Okaneme, G. & Obioha, U. P. (2017): African Humanism as a Basis for Social Cohesion and Human Well-Being in Africa. International Journal of Humanities Social Sciences and Education, 4(5), pp 43-50. doi: http://dx.doi.org/10.20431/2349-0381.0405005

Ouzman, S. (2000): Public Rock Art sites of South Africa. Culna, 2000(55), pp 27-28.

Plumwood, V. (1986): Ecofeminism: An overview and discussion of positions and arguments. Australasian Journal of Philosophy, 64(sup1), pp 120-138.

Pritchard, A., Richardson, M., Sheffield, D. & McEwan, K. (2020): The relationship between nature connectedness and eudaimonic well-being: A meta-analysis. Journal of Happiness Studies, 21, pp 1145-1167.

Radcliffe, S. A. (2012): Development for a postneoliberal era? Sumak kawsay, living well and the limits to decolonisation in Ecuador. Geoforum, 43(2), pp 240-249.

Radel, C. (2009): Natures, Gendered. In: Kitchin, R. & Thrift, N. (Eds.) International Encyclopedia of Human Geography. Oxford: Elsevier, Ch, pp 331-336.

Restall, B. & Conrad, E. (2015): A literature review of connectedness to nature and its potential for environmental management. Journal of Environmental Management, 159, pp 264-278.

Salleh, A. (2017): Ecofeminism as politics: Nature, Marx and the postmodern, Zed Books Ltd.

Salmon, E. (2015): Teaching kincentric ecology in an urban environment. The Journal of Sustainability Education, pp 1-10.

Salmón, E. (2000): Kincentric ecology: Indigenous perceptions of the human–nature relationship. Ecological Applications, 10(5), pp 1327-1332.

Schot, J. & Kanger, L. (2018): Deep transitions: Emergence, acceleration, stabilization and directionality. Research Policy, 47(6), pp 1045-1059.

Schultz, P. (2002): Inclusion with nature: The psychology of human-nature relations. In: Schmuck, P. & Schultz, W. (Eds.) Psychology of Sustainable Development. Geneva: Springer, Ch 4, pp 61-78.

Shiva, V. & Mies, M. (2014): Ecofeminism, London: Bloomsbury Publishing.

Siwila, L. C. (2014): "Tracing the ecological footprints of our foremothers": Towards an African feminist approach to women's connectedness with nature. Studia Historiae Ecclesiasticae, 40, pp 131-147.

Stancioli, B. (2021): A bundle of rights and Pachamama: Visa Kurki's theory of legal personhood. Revus. Journal for Constitutional Theory and Philosophy of Law/Revija za ustavno teorijo in filozofijo prava, (44), pp.

Swilling, M. (2019): The Age of Sustainability: Just Transitions in a Complex World, Oxon: Routledge.

The Art Story. (2023): Summary of Andy Goldsworthy [Online]. London: The Art Story,. Available: https://www.theartstory.org/artist/goldsworthy-andy/.

Tongue, M. H. (1909): Bushman paintings, Clarendon Press.

Tymieniecka, A.-T. (2013): Phenomenology and the Human Positioning in the Cosmos: The Life-world, Nature, Earth: Book One, Dordrecht: Springer Science & Business Media.

United Nations Environment Programme. (2022): The Closing Window; Climate crisis calls for rapid transformation of societies. United Nations: Geneva. Available: https://wedocs.unep.org/bitstream/handle/20.500.11822/40874/EGR2022.pdf. [Accessed 2 March 2023].

van de Water, A., Henley, M., Bates, L. & Slotow, R. (2022): The value of elephants: A pluralist approach. Ecosystem Services, 58, pp 101488.

Walwyn, D. (2022a): Changing Narratives on Rock Art and Exploring New Pedagogies in Achieving an Eco-Decolonial Practice in Environmental Education [Online]. Makanda: Amazwi. Available: https://www.youtube.com/watch?v=nAK1jJML2Ms&list=PLbBYfWwby0X_4iIy1nD2f S1zwswBAq7gw&index=5 [Accessed 8 March 2023].

Walwyn, D. R. (2022b): Published. Nature Connectedness and Discursive Spaces; Understanding Student Responses to Sustainability Education. 2022 IEEE IFEES World Engineering Education Forum-Global Engineering Deans Council (WEEF-GEDC). IEEE, pp 1-5, Available: https://ieeexplore.ieee.org/abstract/document/9996201 [Accessed 7 March 2023].

Whittington, R. (2010): Giddens, structuration theory and strategy as practice. Cambridge handbook of strategy as practice. Ch 8, pp 145-164.

Thematic Field D:

Gender, Science and Technology

Getting Closer to Gender Equality in Research Performing Organisations through Gender Equality Plans?

Tindara Addabbo[1], Ester Cois[2] and Ilenia Picardi[3]

[1]Department of Economics Marco Biagi, University of Modena & Reggio Emilia – Italy

[2] Department of Political and Social Sciences, University of Cagliari – Italy

[3] Department of Political Science, University of Naples Federico II – Italy

Abstract. To what extent Gender Equality Plans (GEPs) can get Research Performing Organisations (RPOs) closer to gender equality and how to detect whether their actions could really be able to make a difference in creating a gender equal environment? And what are the factors affecting the spread of GEPs and enhancing their transformative power? These are the key questions that this paper tries to address with a focus on Italy, a country that on one hand is characterized by higher gender inequalities than on average EU-27 countries and by a relevant gender gap at the disadvantage of women in the higher level of academic career, while on the other hand sees an increasing effort by the Conference of Italian University Rectors (CRUI) and the National Conference of Equal Opportunities Bodies of Italian Universities (COUNIPAR) to support with guidelines and training the universities' path towards gender equality. Specific cases of RPOs' GEPs located in different areas of Italy that are characterized by different levels of gender inequality are also analysed, to show how actions are tailored to the context and are consistent with the gender equality objectives already expressed by their Strategic Plan, reinforcing them and providing the framework for a real change.

Keywords: Gender equality, research performing organizations, participatory process, Gender Equality Plan, structural change

1 Introduction

Following the introduction of the requisite of Gender Equality Plan to access funds in Horizon Europe Programme, an increase in the number of universities and research centers adopting Gender Equality Plans has been observed in the last year. A further impulse in the adoption of Gender Equality Plans (GEPs) by Italian Universities has also been provided through the Conference of Italian Rectors' Guidelines already issued by the Thematic Group on Gender before the complete European Commission Guidelines were published[62]. In the design and monitoring process of GEPs, Italian Research Performing Organisations (RPOs) received support from European Commission-funded projects and could take advantage of training sessions provided within the same projects or organized by the Conference of Italian Universities Equal Opportunities Bodies. The paper provides an analysis of GEPs adopted by Italian Universities in 2021-2022 by means of a mixed-methods approach that combines: 1) a quantitative analysis of the data collected through a survey on the Equal Opportunities Committees of Italian Universities, that aims at improving the knowledge of the process followed by each university in the design and implementation of GEP, in particular by highlighting to what extent the Equal Opportunities bodies have been involved in the design of the Plans and in their implementation; 2) a qualitative analysis of the GEP of six Italian universities, distributed throughout the national territory and chosen as case studies.

The aim of the paper is to ascertain GEPs' compliance with the Conference of Italian Rectors (CRUI) and European Commission Guidelines, with particular attention on the presence of actions covering all the priority thematic areas indicated in the guidelines and the inclusion of equal opportunities committees in the process.

In the GEPs analysis, special attention is also provided to the interconnection of GEPs with RPOs' Strategic Planning and within the gender budgeting cycle.

The paper allows a reflection on the process of increasing investment by Italian universities on the topic of Gender Equality promotion, fight against inequalities, and diversity support, with the aim of highlighting how much has the GEP - as a strategic planning tool - strengthened or accelerated this process. The interest in analysing the role of GEP in this process stems from the authors' expertise as researchers in the field of gender studies in academia, involved in the implementation of GEPs in different Italian

---

[62]The Vademecum for the elaboration of the Gender Equality Plan in Italian universities was produced by the GEP Working Group of the CRUI Commission on Gender Issues, and approved at the CRUI General Assembly on 22 July 2021 (https://www.crui.it/archivio-notizie/vademecum-per-l%E2%80%99elaborazione-del-gender-equality-plan-negli-atenei-italiani.html).

universities promoted by different European projects, and with different roles in activating gender policies in Italian academia.[63] Being the monitoring process in progress, the paper also allows a critical assessment on what is required to make the GEP adoption not just another regulatory compliance, but the lever to propel institutional change towards better inclusion and enhancement of diversity already underway in Italian universities.

2 Gender Equality in Italian Universities

The focus of this paper is on the current situation regarding the impact of Gender Equality Plans on the path to gender equality in Italian universities. The choice of Italy is justified in terms of a still low and improvable general achievement in terms of gender equality, with respect to other EU countries, but, at the same time, of a remarkable effort made by Universities' associations to drive a process of change towards gender equality supported by the European Commission Programmes and actions.

Not only the last available EIGE data on the Gender Equality Index show a sensibly lower percentage of graduates amongst 15+ Italian population both for men and for women, but also Italy is the last, in terms of gender balance, in the work dimension, with an achievement of 63.2 against the EU average of 71.7. On the whole the Gender Equality Index in Italy is below the EU average (65 against 68.6) (Table 1).

Table 1 – Indicators on Graduates by gender and Gender Equality Index

	EU-27	IT
%M Graduates on 15+ M	26	14
%W Graduates on 15+W	27	17
Work dimension	71.7	63.2
GEI	68.6	65

Source: EIGE (2022) data available at https://eige.europa.eu/gender-equality-index

Turning to the academic staff in Universities, as the last available indicators in the report *She Figures* shows (European Commission, 2021a), Italian women's representation in different grades of their academic career is lower than men in Grade A, B and C and their

---

[63] The authors took part, with different roles, to the following EU funded research projects: GENOVATE (FP7 - 321378), LeTSGEPs (H2020-SwafS-2019 – 873072), EQUAL-IST (Horizon 2020 GERI-4-2015), SUPERA (Horizon 2020 research and innovation programme - 787829) and are members of the Conference of Italian Rectors Group entrusted to write the guidelines on GEPs for Italian Universities.

share is in general lower than the average for EU-27 countries in Grade A and Grade B (Table 2). The percentage of women in Grade A position in STEM fields is even lower than in EU-27 countries on average (Table 3).

Table 2 – Share of women by Grade in the academic career – Italy and EU

	EU-27	IT
Grade A	26.18	23.74
Grade B	40.29	38.41
Grade C	46.61	46.77
Grade D	47.98	50.13
Total	42.32	40.48

Source: European Commission (2021a)

Table 3 – Percentage of women among grade A staff, by main field of R&D, 2018 –

Italy and EU

	EU-27	IT
Natural Sciences	21.99	24.3
Engineering and Technology	17.91	13.84
Medical Sciences	30.08	17.05
Agricultural Sciences	28.5	19.45
Social Sciences	30.85	27.46
Humanities	34.95	37.43

Source: European Commission (2021a)

3 The Role of the European Commission for the adoption of GEPs in Italian Universities

In recent years, the new provisions introduced by the European Commission to access research and innovation funding programmes and the availability of dedicated guidelines has greatly contributed to boost the design and the adoption of GEPs in all Italian universities. As is well known, indeed, the European Union's Framework Programme for Research and Innovation "Horizon Europe" prescribed new requirements to strengthen gender equity in European organizations. According to these indications, adopting a GEP is an eligibility criterion for research organizations and higher education institutions to access Horizon Europe research program funding. Addressing these specific contexts, the European Commission defines a GEP as a strategic plan aimed at: a) conducting impact assessments/audits of procedures and practices to identify gender biases; b)

identifying and implementing innovative strategies in order to correct gender biases; c) defining objectives and processes to monitor progress through indicators. The European Commission also provided precise indications on the implementation of GEPs, which should have been adapted for fitting the normative, social, and cultural diversities that distinguish the States members of the European Union and the specific organizations in which these directions were to be applied. In particular, the European Commission has specifically requested to pay attention to the following areas of intervention, for the identification of the actions proposed in the GEP: Area 1, Work-life balance and organisational culture; Area 2, Gender balance in top positions and decision-making bodies; Area 3, Gender equality in recruitment and career advancement; Area 4, Gender mainstreaming in research and teaching programmes; Area 5, Measures to combat gender-based violence, including sexual harassment.

In the Italian academic context, in accordance with the Gender Mainstreaming Strategy, the GEP has been interpreted as the main document that defines the universities' strategy for gender equality, first of all aimed at strengthening the introduction of a gender-sensitive perspective in their Strategic Plans. To achieve this goal, the GEPs have to be formally included in the universities' planning procedures and synchronized with the Positive Action Plan (PAP) already provided by the Italian regulations, and, finally, drafted in continuity with the Gender Budgeting (GB) process, that has been described in a quite recent dedicated document by the CRUI Gender Issues Commission, CRUI (2019)[64].

Indeed, as we already mentioned, a big effort has been made both by the Conference of Italian Universities Rectors (CRUI) and by the National Conference of Equal Opportunities Committees (COUNIPAR) to positively contribute to the adoption both of GBs and GEPs in Italian Universities, by supporting them in the design and implementation of these tools through dedicated guidelines. Specifically, the guidelines for gender budgeting (Addabbo et al., 2018; CRUI, 2019) as well as for Gender Equality Plans (CRUI, 2021), together with training courses and workshops have strongly enhanced the degree of awareness and knowledge on the more suitable and effective practices for achieving gender equality. To what extent this attention at national level and the spread of gender budgeting in regions and in municipalities in Italy - strengthened by the choice of the National Recovery and Resilience Plan (NRRP), in 2021, to make gender budgeting structural throughout the Public Administration - can be related to the observed high presence of gender budgeting in Italian Universities has been discussed in Addabbo, Badalassi and Canali (2021) and can also be related to the current observable propagation of GEPs in Italian universities, the main focus of this paper.

---

[64] https://www.crui.it/bilancio-di-genere.html

Moreover, a major factor in ensuring GEPs' circulation in Italian universities is related to the well-established existence of dedicated EU funded programmes, as a significant number of Italian Research Performing Organizations have been or still are part of Sisters Projects aimed at supporting them in the process of GEPs' design and implementation.

4 The presence of GEPs in Italian Universities

We propose here a preliminary analysis on the adoption of GEPs by Italian Universities in 2021-2022, based on microdata collected through a Survey on the Equal Opportunities Committees of Italian Universities carried out by COUNIPAR in 2021 and 2022. The survey aims at improving the researchers' knowledge on the process followed by each university in the design and implementation of GEPs and on the role specifically played by Equal Opportunities bodies in each step; a knowledge that is shared, during the annual conference of COUNIPAR, gathering equal opportunities delegates and members of the Equal Opportunities bodies of Italian Universities.

The Sample is made out of 45 Committees that took part in the Survey in July-September 2022 (22 of them took part also in the 2021 survey), and 34 in 2021 (out of 97 Italian universities, of which 67 public, 19 private legally recognized, 11 telematic private legally recognized).

As shown in Table 4, there has been an enormous increase in the number of universities that have now a GEP, from 9% in 2021 to 89% in 2022. The timing of the GEPs' approval is also showing the impact of the new Horizon Europe mandatory prerequisite, from the end of 2021 onwards. In fact, of those universities that had a GEP in 2022, 27% approved it in 2021, 61% in 2022; only 7% adopted it since 2020, and just 5% before.

Another interesting peculiarity of Italian universities is that before the GEPs became prescriptive, they were required by Italian Law to provide a Positive Action Plan having a wider focus than GEPs. However, the analysis shows the potential higher impact of GEPs also in this case, since only 50% of the Positive Action Plans, designed by the universities involved in the survey, linked their actions to specific key performance indicators (KPIs), against 98% of GEPs, thus increasing the potential effectiveness of each proposed action. This is also in line with the requirements pointed out by the Horizon Europe Guidelines, to which as much as 90% of the analysed universities stated to be compliant (while 76% declared they were compliant to the CRUI guidelines issued before the European ones).

Table 4 – Percentage of Italian Universities involved in the COUNIPAR surveys by GEPs' status

	2021	**2022**
In progress	73.5	6.7
No	17.7	4.4
Yes	8.8	88.9
Observations	34	45

Source: Our elaborations from COUNIPAR data

A first important indicator of the degree of participation in the process of GEP's design is to what extent the Equal Opportunities Committees have been involved in each step. Actually 95% of GEPs have shown the involvement of Equal Opportunities Committees, a much higher degree of involvement than in other Strategic Planning Processes (where the figure is around 60%).

The interaction between the presence of Gender Budgeting and GEP seems to occur quite frequently, since 37% of the universities that in 2022 were reported to have adopted a GEP, also had Gender Auditing and Budgeting, while 42% had only Gender Auditing and 20% stated to have started drafting their Gender Auditing.

These first figures would look promising in supporting the hypothesis that GEP adoption in Italian Universities hasn't been just another regulatory compliance, but the lever to propel institutional change towards better inclusion and enhancement of diversity, already underway in most of them. However, Monitoring & Gender Impact Evaluation of GEPs actions are currently taking place and their real transformative impact cannot be evaluated at this stage. So, it will be necessary to wait at least for the expiry of the first waves of GEPs to be able to make medium-term assessments.

However, we can already try to "enter" into the logic and mechanisms activated by Italian universities to assign a real transformative scope to their GEPs, taking into consideration some specific cases by way of example. Specifically, in the following section we will analyse six case-studies related to RPOs located in different areas of Italy and characterized by a different baseline situation in terms of gender equality.

5 Different paths to Gender Equality: some case-studies based on Italian Universities' GEPs

In order to understand the impact of European guidelines on the institutional policies of Italian universities, after presenting some results of the survey carried out by the COUNIPAR, we applied qualitative research techniques for analysing six GEPs recently adopted by six different universities. For this pilot study, we selected GEPs from universities that have achieved a well-known experience in institutional gender equality policies, having been partners in European funded projects aimed at the implementation of gender equality actions. In particular, for this analysis, it was decided to choose large and medium-sized universities according to the criterion of ensuring a geographical representation of the whole Italian territory.

The GEPs analysed are generally concise, which is understandable, given the need to adapt their strategic objectives to European indications within a very tight timeframe. They were approved by each university academic body (the Senate and the Board of Directors) within the end of 2021 (in one case in 2020, even before the guidelines were published) and made available on their official websites no later than early 2022, i.e. only a few months after the publication of the EU guidelines. Therefore, the design of the actions included in these GEPs has been largely based also on documents previously drawn up by academic institutions, such as the Gender Budgeting, which had already provided useful in-depth context analyses, and the Positive Action Plans, already promoted by the CUGs.

In order to systematize our comparative study of GEPs, we identified five main analytical dimensions:

1) their consistency with CRUI and Horizon European guidelines;
2) their direct linkage with specific European projects;
3) the coherence of their designed actions with the main needs that emerged from the previous context analysis;
4) the activation of participatory processes in each step, through the involvement of different actors from the design of the GEP to its implementation;
5) the GEP's publication and dissemination strategies.

Proceeding point by point, first of all the analysis of the GEPs shows a general consistency with the European indications and their contextualization in Italian academic institutions provided by the CRUI working group. Specifically, the actions reported in all documents covered the five thematic areas of intervention identified by the European Institute for Gender Equality (EIGE), just as the four mandatory qualitative requirements for the drafting of GEPs appear to be respected: their public configuration, the provision

of dedicated resources, the guarantee of data collection and monitoring, and the relevance attributed to training. Explicit reference is also made to the KPIs for the monitoring and evaluation phases and to the collaboration established with the universities' stakeholders in drafting the GEP.

Regarding the second point, although all the universities involved in this first analysis had participated in European projects aimed at bringing about conditions of greater gender equality, not all the GEPs analysed explicitly mention these projects. While in three cases the adoption of the GEP was part of the project tasks or its main ouput, in others not only is the European experience not mentioned, but the expertise developed thanks to that international co-learning opportunity has been only partially used in the drafting of the document.

Moving on to the third point, the connection between the type of actions designed in the final document and the previous context analysis is not always clear or mentioned in the GEPs under study analysis. If, in some cases, the context analysis is not reported in the GEP, in others it is limited to a very brief report with statistical and descriptive information without entering into the merits of the processes that contribute to determining, for example, the segregation phenomena observed. Just in one case, the document specifies the expectation of research results aimed at taking a better picture of that university from a gender perspective, which may contribute to the strengthening of its GEP and the definition of structural and cultural actions more targeted to counteract the detected asymmetries. In two other cases, the GEPs took also advantage of very recent in-depth context analysis carried out by those universities as a basis of their Gender Budgeting Reports, that are reminded in the first part of the GEPs, while only in one case specific references are made to the related actions. A system of indicators shared within EU funded projects is explicitly used and referred to in two of the GEPs, that explicitly make reference to those international projects as the levers of the cultural and organisational change in a gender-sensitive way. One of them also refers to an ad hoc survey carried out to gather the degree of consensus on potential Gender Equality Actions and to investigate perceived discrimination.

Regarding the participative aspects, the GEPs analysed were drawn up by boards that involved the CUG, sometimes the Gender Budgeting Working Group, and sometimes members of European gender projects or research councils already established within the universities, before being discussed and approved by the top management. From the documents analysed, however, it is not always possible to deduce the activation of participatory processes aimed at involving the various actors who, within the institutions, could have consolidated expertise on gender issues and for this reason could have contributed to a greater acceptance and a better dissemination of the policies promoted. Nor is it possible to identify the qualitative or quantitative methods applied to involve

representatives of all the different bodies and populations present at the university (teaching and technical-administrative staff, students) and to gather their participation in producing the final document. Nevertheless, in at least three cases some evidences accompanying and presenting the GEPs (e.g. news collected by the press offices and linked to the universities' webpages dedicated to gender promotion policies) mention experiences like fab labs or focus groups, that have been conducted in the drafting phase.

However, in general the short time available - from the issuing of the guidelines to the expiry of the first call for proposals to access EU funds, that required the publication of a GEP - hindered other actors' involvement in the design process, which would have required time-consuming procedures. In the coming years, it will therefore be essential to continue evaluating the policies that academic institutions will pursue in favour of gender equality in order to understand whether the limits currently encountered can be overcome over time, and to ensure that the institutionalization of gender equality does not become a bureaucratic exercise, but, on the contrary, is able to promote real participatory and transformative processes implemented within academic institutions.

Turning to the last point, the publication and dissemination strategies of the GEPs analysed, we can confirm that they have all been approved by the academic bodies and published both in Italian and in English on the Universities' websites, sometimes on dedicated sections linked to the official homepage to be as accessible as possible, or within the strategic planning or open budget data section of the website. In all cases, the websites' archives also show evidence of the news on the GEPs' approval or their public presentation. In one of the GEPs analysed, reference is made to the design of GEP's communication stressing the importance of being both internal and external, with the aim of involving external stakeholders but also of getting as wider as possible within the university, in order to communicate the actions and involve in their implementation all the components at department level.

6 An example of strategic action for gender equality: work-life balance and organisational culture

An in-depth analysis of the different GEPs, which goes beyond the aggregated data that reveal the current trends on this policy front in the Italian academic landscape, allows us to address some key issues. In particular, two questions appear interesting: to what extent the proposed actions are designed by taking into account the RPO's critical areas in terms of gender equality? Is there a continuity with regards to the actions included in the Positive Action Plan?

To answer these questions, in the final part of this paper we propose a little analytical exercise, referring to a specific strategic action, connected to the area of work-life balance and organisational culture.

One of the priorities that, according to the Horizon Europe guidelines (European Commission, 2021b), RPOs should affect by the actions included in their GEPs is work-life balance and organisational culture. All the analysed GEPs include actions to address this priority. And in these cases, the actions designed in the area of work-life balance reflect the different situations of the areas where the universities analysed are located. In fact, in 2021, the percentage of children attending kindergarten on the total population aged 0-2 ranges from 6.7% in the South to 19% in the Centre-North (Table 5). To increase the coverage of early childcare service, a three-years plan to develop childcare facilities has been introduced by the 2007 Budget Law (Law 296/2006) and then renewed in the following years. However, though there has been an increase of kindergartens the gap at the disadvantage of Southern regions persists (Giorgetti & Picchio, 2021).

The lower presence of early childcare services in the areas where two of the Universities analysed are located, is reflected also in the needs of the personnel, as resulting from a survey delivered by the same Universities. The actions designed, linked with the policies in their Positive Action Plans, aimed at improving childcare services within the workplace and the development of nursing areas.

Different actions on work-life balance have been developed by another medium dimension university located in the North of Italy, in an area where the coverage of kindergartens is much higher than on national average. Again, in continuity with policies in its Positive Action Plan, the GEP action consists in promoting a survey on the need of the personnel to design policies able to improve work-life balance, taking into account the existing childcare services and social infrastructures, in order to provide attention also on early career researchers and students as care-givers, in a context characterized by very low fertility rates and by a high degree of population ageing. In analysing GEPs actions in the area of work-life balance, one has to consider the inequality in the allocation of care work within the Italian couples, still characterized by a much higher amount of time and care responsibilities by women than men and by a very low take-up of fathers' parental leaves (Addabbo *et al.*, 2022) that call for a more equal gender distribution of unpaid care work and dedicated policies.

Table 5 – Percentage of children attending kindergarten on the total population aged 0-2 by area.

	2021
Centre-North	18.8
South	6.7
Italy	14.5

Source: ISTAT (2022) data available at:
http://dati.istat.it/Index.aspx?DataSetCode=DCIS_SERVSOCEDU1

So, here are some tips for further analysis on these topics. Specifically, the following processes should be detected within different Italian universities, located in areas that are characterized by a different presence of childcare services:

- o Awareness of the external and internal situation in terms of work-life balance;

- o Design of actions consistent with the external and internal context, in terms of presence of childcare services, by detecting the needs expressed by the personnel through a specific survey, before the action design is carried out (as done by the mentioned Southern Universities); or by detecting other different needs expressed by the personnel, when they are already aware of the existence of a good coverage of childcare services, in order to collect further suggestions, in terms of agreements with the existent services or for introducing forms of working time flexibility to match the childcare services time schedule (as done by the mentioned Northern University);

- o Link with previous Positive Actions Plans;

- o Presence of specific KPIs that can allow monitoring of the actions, thus potentially increasing their efficacy.

7 Conclusions and further developments

The investigation presented in this paper provides a pilot study that, through a mixed-methods approach, indicates a methodology of analysis aimed at understanding how policies promoted by the European Commission can (or cannot) be translated into transformative practices within academic institutions.

The increase in the number of Universities in Italy approving GEPs can be related to the inclusion of the GEP as a pre-requisite to Horizon Europe funding, and to the diffusion of GEP's guidelines issued by the EC and by the Conference of Italian Universities Rectors.

Almost all the GEPs analysed report compliance with these guidelines and have involved the Equal Opportunities Committees in the process.

In the Italian context, there is also a high co-presence of Gender Budgeting (GB) and Gender Equality Plans (GEP) processes and more attention should be paid on the interaction between the two in shortening the path to gender equality. Will the presence of GB enhance the transformative process of GEPs? What is then the added value of the interaction of GEP and GB for sustainable and transformative GEPs? Should Gender Auditing be extended to analyse the GEPs actions?

GEPs have been approved by most of the Italian universities in 2021 and in 2022 and many of them are currently undergoing a monitoring process, leading to reflect upon the actions designed, the barriers to their development and the need for new actions.

As displayed by the six case-studies chosen for exploring, in a comparative way, the content of some GEPs from Italian universities located in different areas of the country, it is precisely in this phase of almost total flowering of GEPs that it is important to promote well-documented analyses, capable of going beyond the drafting step, in order to provide insights on the link between the actions designed and the degree of knowledge of the current context, as well as on the impact of these actions in the next future.

Acknowledgements

References

Addabbo, Tindara, Pulejo, Luisa; Tomasin, Paolo; Tomio, Patrizia (2018): Linee guida per il bilancio di genere delle Università. Una proposta operativa. (Versione 1.0), in Kodilja, R., Tomio, P., eds. (2018): Partecipazione ed empowerment delle donne. Organismi di parità universitari a sostegno dei potenziali. Pisa: ETS, 209-282. ISBN: 9788846753205

Addabbo, Tindara; Badalassi, Giovanna; Canali, Claudia (2021): Gender Budgeting in Academia: A Powerful tool for Gender Equality. In Elisabeth T. Pereira, Carlos Costa and Zélia Breda (eds.), Proceedings of the 4th International Conference on Gender Research, University of Aveiro Portugal, 21-22 June 2021, Reading, Academic Conferences and Publishing International Limited ISBN: 978-1-912764-94-5, pp.1-7, DOI: 10.34190/IGR.21.043.

Addabbo, T., Cardinali, V., Giovannini, D. and Mazzucchelli, S. (2022): 'Italy country note', in Koslowski, A., Blum, S., Dobrotić, I., Kaufman, G. and Moss, P. (2022) 18th International Review of Leave Policies and Related Research 2022. DOI: 10.18445/20220909-122329-0. Available at: https://www.leavenetwork.org/annual-review-reports/review-2022/

Conference of Italian University Rectors, CRUI (2019): Linee guida per il bilancio di genere negli Atenei Italiani. Available at: https://www.crui.it/bilancio-di-genere.html

Conference of Italian University Rectors, CRUI (2021): Vademecum per l'elaborazione del Gender Equality Plan negli Atenei italiani. Available at: https://www.crui.it/archivio-notizie/vademecum-per-l%E2%80%99elaborazione-del-gender-equality-plan-negli-atenei-italiani.html

European Commission (2021a): She Figures 2021. Gender in Research and Innovation Statistics and Indicators. Luxembourg: Publications Office of the European Union. DOI: 10.2777/06090.

European Commission (2021b): Horizon Europe Guidance on Gender Equality Plans (GEPs). Luxembourg: Publications Office of the European Union. DOI: 10.2777/876509

Giorgetti, Isabella and Picchio, Matteo (2021): One billion euro programme for early childcare services in Italy, Metroeconomica, 72(3), pp. 460–492. Doi:10.1111/meca.12329.

Gazing Feminization and Masculinization through Image Engagement and Deployment during Hormone Treatment of Trans*[65] Persons: Approaching Images in an STS Case-Study

S. Gahbauer[1,2]

[1]Center for Public Health, Department of Social and Preventive Medicine, Medical University of Vienna, Austria
[2] Department of Science and Technology Studies, University of Vienna, Austria

Abstract When investigating hormone treatment, images are not only used in order to deliver a visible proof for research findings in medical publications, they are rather a central site where different states of trans* as well as practices of feminization and masculinization are materially enacted. Using and spreading images that come from MRI and PET brain scans, from scientific and popular image databases is a crucial practice when publishing scientific research results on hormone treatment, be it in scientific or in popular media. Images do not only make something visible but rather contribute to how we talk about trans* persons and practices of change, be it a feminization or a masculinization during hormone treatment. Tracing these images through different media I will also be careful about the possibility of enacting hybrid formations while presenting research on trans* persons. The research material was collected between 2016 and 2023: it consists of images (and other modes) in research articles- published in scientific journals and in popular media, and of (problem-centered) interview data as well as of data produced during my interactive conference talk in the session "queer fiction and technologies". For the purpose of this paper, I will introduce three analytical and methodological steps that I conducted during my investigations. The latter covers research on the image itself (compositional analysis), on images and other modes (multimodal analysis) and interactive research on images. The results showed that medical images on trans* persons do hardly travel beyond the scientific realm throughout the case whereas popular images open spaces for interpretative flexibility in different informed groups. Talking about images turned out to be a valuable tool for the validation of single image analysis.

---

[65] The social category trans* points to the fact that a binary understanding of living ´sex´ and ´gender´ does not adequately depict the lived realm, be it questioning binary categories men and women or male and female be it focusing on aspects of living in ´a wrong body´. Since trans* is a generic term for many different, even contradictory, ways of living ´sex´ and ´gender´ non-binary (Baumgartinger, 2017), I pay special attention to this multiplicity and thus use trans* with an asterisk to point to this multiplicity.

1 Introduction

It was in the beginning of 2016, we were just preparing a session for the seminar in "Gender Studies" at the Academy of Fine Arts, Vienna, when a colleague who had undergone hormone treatment in a sense of a feminization told me about a publication list that her attending physicians sent to her. Since she was participating in the study as a trans* person doing hormone treatment, she was not happy about the arguments the authors made about trans* persons in these texts. So, she asked me to take a closer look at the commented publication list, which figure 1 shows in excerpts:

-------- Forwarded Message --------
Subject: Vielen Dank für Ihre Studienteilnahme am AKH
Date: Tue, 8 Mar 2016 13:56:33 +0100

… Die anonymisierten Ergebnisse wurden bisher in sieben Publikationen veröffentlicht. Drei weitere Publikationen sind gerade in Arbeit. …

Die veröffentlichten Studienergebnisse sind im Internet zugänglich, allerdings alle auf Englisch, hier eine Auswahl:

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4585501/>http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4585501/

<http://onlinelibrary.wiley.com/doi/10.1002/hbm.23133/abstract>http://onlinelibrary.wiley.com/doi/10.1002/hbm.23133/abstract

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4699258/>http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4699258/

Auch die PET-Studie brachte sehr interessante Ergebnisse. Sie zeigte, dass Testosteron einen Baustein im Gehirn erhöht (den sogenannten Serotonintransporter), der bei der Depression eine wichtige Rolle spielt. Hier die Publikation dazu:

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4585531/>http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4585531/

Auch die Medien wurden auf unsere Studienergebnisse aufmerksam (u.a. die Presse, Kurier, Standard, aber auch New York Times, The Globe and Mail…). Hier ein paar Beispiele:

<http://science.orf.at/stories/1751987>http://science.orf.at/stories/1751987

<http://kurier.at/lebensart/gesundheit/weltweit-erste-studie-testosteron-unterstuetzt-stimmungsaufhellende-antidepressiva/110.330.352>http://kurier.at/lebensart/gesundheit/weltweit-erste-studie-testosteron-unterstuetzt-stimmungsaufhellende-antidepressiva/110.330.352

<http://derstandard.at/2000010065276/Transgender-Neuronen-anders-vernetzt>http://derstandard.at/2000010065276/Transgender-Neuronen-anders-vernetzt

<http://diepresse.com/home/science/4679523/Das-Gehirn-bestimmt-das-Geschlecht>http://diepresse.com/home/science/4679523/Das-Gehirn-bestimmt-das-Geschlecht

<http://diepresse.com/home/science/4651727/Testosteron-kann-glucklich-machen?from=simarchiv>http://diepresse.com/home/science/4651727/Testosteron-kann-glucklich-machen?from=simarchiv

<http://diepresse.com/home/science/4919811/Macht-zu-wenig-Testosteron-traurig?from=simarchiv>http://diepresse.com/home/science/4919811/Macht-zu-wenig-Testosteron-traurig?from=simarchiv

<http://www.theglobeandmail.com/life/science-in-transition-understanding-the-biology-behind-gender-identity/article25553156/>http://www.theglobeandmail.com/life/science-in-transition-understanding-the-biology-behind-gender-identity/article25553156/

<http://www.nytimes.com/2015/08/23/opinion/sunday/richard-a-friedman-how-changeable-is-gender.html?_r=0>http://www.nytimes.com/2015/08/23/opinion/sunday/richard-a-friedman-how-changeable-is-gender.html?_r=0

I, in the end, chose to analyse this particular research work in the frame of a PhD project[66], because the research project at hand (for the publication list see also figure 1) is one of the rare studies on hormone treatment of trans* persons. In the course of this study – at different points in time – brain scans of more than 120 persons were made in order to investigate the impact of hormone treatment on their brain functions. The study results were presented as first data relating effects of testosterone on the serotonin system and prominently published in *Biological Psychiatry*, a highly ranked journal (10,255). This fact was also institutionally recognized, in September 2015 the first author was honoured as Researcher of the Month at the Medical University of Vienna. The study results were also published in (Austrian, American and Canadian) popular mass media and offer a large amount of visual material and diverse interpretation efforts. The case represents, thus, state-of-the art research on how trans* is visually (re) presented in scientific medical publications, but also how this is travelling well beyond the scientific realm into public arenas. However, in this body of science communication - when starting my case study, I could find 28 images, in which visualizations, tables and graphs were included. The number of images per article ranges from 1 to 9.

By introducing MRT into the medical field a "visual turn" could also be observed in medical sciences (Haraway, 1991). Contemporary visual cultures value science, and thus, give importance to research results that are produced within the medical discipline. Thus, brain images of trans* persons are very powerful in and outside of scientific publications. While using images in scientific journals or in popular mass media, they establish authoritative knowledge about trans* persons (Joyce, 2005) and, hence, materially enact categories such as ´trans*´, ´sex´ and ´gender´.

As such, for research on trans*, it is valuable to investigate images as non-human actors that have the capacity to travel and to connect different social arenas. Therefore, in this paper I will introduce the three conceptual and methodological steps that I applied during my case study. During the queer session of this year´s STS conference in Graz I discussed two pre-selected images with the audience and I will also present the results

---

[66] Knowing well that my research work is deeply entangled with my research field I shortly I want to reflect on and describe my position throughout the research project: I am a PhD-student and researcher in the field of Science and Technology Studies who is working for the Medical University of Vienna. I am also trained in Sociology and Fine Arts; further, I participate in art projects. Two persons who participated in the study I know personally. The sum of my professional expertise and experience informs my position that is driven by various layers of involvement in the issue. I am well aware of the challenge of having to balance research interest, political engagement, personal relations and artistic photography. I work with medical images in the context of exhibitions, and art/ science competitions. At another level I face the challenge to balance potentially conflicting interests of the research group, my team at the Medical University, the study participants, and funding agencies. I aim at establishing a cooperative climate to facilitate relations between individuals and disciplines and to pay special attention to the impact the knowledge I will produce might have on the broad range of actors involved in the research topic. Furthermore, being a mother of a 4-year-old son nourishes my research work.

of this conference talk that I conceptualized as a research practice. At the end of this paper we will come to an understanding of the biomedical gaze on trans* persons, feminization and masculinization through the use of images in scientific publications and in articles published in popular media and on the images´ interplay with other modes of communication, as well as how images are viewed in different social arenas.

2 Getting Hormone Treatment and Sites of Being Classified

There are two possibilities of treatments, one with female sexual hormones towards a feminization and, the other with male sexual hormones towards a masculinization. Whereas the medical community considers *"transgender and gender diverse (TGD) people as (Annotation of the author) members of the many varied communities globally of people with gender identities or expressions that differ from the gender socially attributed to the sex assigned to them at birth" (Coleman et al., 2022, p 55)* as rather static, for me it was important to consider also dynamics that are inherent to gender-affirmative healthcare. Therefore, I reflected on hormone treatment as transitions in terms of feminization and masculinization through dispensing high doses of sex hormones.

In Austria, medical treatments are carried out in accordance with the Standards of Care of the World Professional Association for Transgender Health (WPATH). Therefore, getting hormone treatment is tied to a psychiatric diagnosis called "gender dysphoria" which is listed in American Psychiatric Associations´s (APA) Diagnostic and Statistical Manual of Mental Disorders (DSM-V). The manual lists diagnostic criteria, which allow either getting or being denied hormone treatment. Since the diagnosis "gender dysphoria" is an important prerequisite for getting hormone treatment, applying the diagnostic criteria must be considered as one site of classifying and standardizing trans* persons during hormone treatment.

One further important site is the research practice of MRT (magnet-resonance-tomography) and PET (positron-emission-tomography)[67] scanning at different points in time, such as at the beginning of the treatment, after four weeks and after three months for instance. These practices of image production can be seen as a further particular (re) presentation of trans* persons, since visual (re) presentations are deeply gendered, in material and in symbolic ways (Faulkner, 2001). As such, images are a central site where trans* persons and the multiple specific aspects of trans* persons lives are enacted and

---

[67] Positron emission tomography (PET) is a nuclear medicine process using various radioactive substances (tracers) in order to display metabolic processes in the body. One area of application – among others - is neurology.

must, thus, be considered as an important actor establishing, transforming or changing knowledge on trans* persons, hormone treatment and aspects of feminization or masculinization.

3 Approaching Images in an STS Case-Study

Medical images have become key actors in establishing, what can be regarded as research finding in medical publications. Furthermore, they are deeply entangled with the ways in which medical knowledge develops and deploys classifications and standards for social categories, such as trans*, sex and gender. The following three concepts, thus, will allow me to see entanglements between classifications of trans* persons and the visual as central element in medical knowledge production.

3.1 Image Engagement and Deployment

Speaking with the idiom of co-producing gender and technology, which is *"a two-way mutually shaping relationship between gender and technology in which technology is both a source and a consequence of gender relations and vice versa"* (Faulkner, 2001, p 81) MRT and PET scans are of particular interest when talking about sites of being classified during hormone treatment. Practices of making trans* persons visible is deeply entangled with classifying research subjects into different groups and, thus, with talking about the social category ´trans*´ in a particular way. However, images might also change how trans* is viewed by others when made relate to other groups of people.

The role of the technologies involved in the processes of creating images of ´trans´ persons refer to one of the three topics suggested by Valerie Burri and Joseph Dumit, namely "image production" (Burri and Dumit, 2008, pp 301). Starting with the abovementioned publication list provided by my colleague, I collected further data following the ongoing publication activities of the research group in highly ranked scientific journals as well as in established popular media, and collecting other materials, such as lecture announcements of study authors, (linked) webpages, online-forums and art formats. I also conducted problem-centered interviews with study authors (Witzel and Reiter, 2012). At the conference in Graz, two pre-selected images were further discussed with the STS queer community. Since I investigated images as a material enactment while establishing and communicating scientific research results on feminization and masculinization, the material that I analysed did not only comprise images but also text and other modes of communication, such as screens for online publications.

Since studies on trans* persons are rare and since the schedule of such a research project would go beyond the time frame of a PhD-project, my ex-post analysis focuses on "image engagement" and "image deployment" (Burri and Dumit, 2008, pp 301). Whereas the first focuses on the instrumental role of images in scientific knowledge production, the latter refers to the use of scientific images in different social arenas. Typical questions that image engagement deals with, are the ways images are talked about and what role they play in this talk. Image engagement also is about the question what concepts images do (re)present and what forms of creativity they do engender whereas image deployment refers to the momentum when images leave the environment of their production. Entering different social arenas and intersecting with different forms of knowledge it is interesting to see how images´ capacity to persuade can be sustained when leaving the laboratory and the clinic (Dumit, 1999).

3.2 Visual (re) presentation

The brain scans the material provides do only make certain regions of the brain visible but rather are a result of multiple formalization and transformation processes that turn a brain into more than a neutral scientific proof (Lynch, 1985, Lynch, 1988). Since images are a crucial element in the process of gradually establishing research results, it is of deep interest how numeric models produced while scanning brains of trans* persons are transformed into images used for publishing in scientific journals and in popular mass media (Amann and Cetina, 1988). Practices such as labelling, cutting the visual material, or aggregating brain scans are of high interest at that point. However, medical images do not only gradually reduce complexity, they also hold the potential to change ways of seeing and, thus, shaping collective meanings (Burri, 2012). Jordanova investigated anatomical images´ capacity to persuade. She found out that medical images do not only represent ´sex´ and ´gender´, they are rather constitutive to our understanding of these categories (Jordanova, 2004). All these extended concepts of representation refer to synchrony of representation and presentation. Quoting Donna Haraway medical images are *"…highly specific visual possibilities, each with a wonderful detailed, active, partial way of organizing worlds"* (Haraway, 1991, p. 177). Consequently, they offer certain possibilities of what can be said, and leave out others, such as rather presenting ´sex´ than ´gender´ aspects. Thus, it is crucial to fully understand (re) presentations of trans* persons in scientific journals and popular mass media, and how these images transform and standardize ways of seeing trans* persons and practices of feminization and masculinization.

3.3 Gazing feminization and masculinization

Since I am rather interested in investigating the images´ capacity of (re) presenting feminization and masculinization, then their contribution to establishing scientific research results, I chose to apply a critical analysis. My critical position also relates to the fact that medical images are produced on the background of scientific institutions while creating a scientific view on trans* persons during processes of image engagement and deployment. As images are never innocent, but deeply entangled with social categories, the term "gaze" might relate to medical images as a disciplinary technique that disciplines both, the viewer and the viewed (Kress and van Leeuwen, 1996). In this sense, images as gazes support practices of constituting certain relationships between trans* persons, control groups, brains, hormones and so on and so forth. Sturken provided a definition that allows me to capture the use of visualizations as gazes: *"By discourse… a group of statements that provide a means for talking (and a way of representing knowledge) about a particular topic at a particular historical moment. Hence discourse is a body of knowledge that both defines and limits what can be said about something"* (Sturken, 2001, p 105). Following that definition, medical images of trans* persons are disciplinary tools used as proofs in medical knowledge production but allowing a certain view on practices of feminization and masculinization at the same time.

4 What does this mean methodologically?

Between 2016 and 2023, starting with this body of science communication (see in detail figure 1 in the introduction), I collected further data by tracing the principal investigators´ publication lists and work and, by interviewing medical researchers (2020-2021). These semi-structured problem-centered interviews (n=4) covered four main topics, which were researchers´ understanding of the social category trans*, hormones, timely aspects of being trans* and the use of visuals in their research work. My analytical work being considered for this paper focused on the images in the material, amending the visual analysis with discourse analytical aspects considering scientific articles, articles published in popular media, forum entries, talk announcements and a master thesis amongst others. I further contextualized the visual data with visual material from other social arenas, such as art, film and fashion.

With a few exceptions, the use of images in social research does not have an as long tradition as conducting interviews and text interpretation for instance have. Since visual methodologies rather focused on aspects of how to gather data using images (such as photovoice methodology), STS studies rather put the focus on the image itself, its materiality and its social effects. Investigating the social effects of scientific images is

rather a new methodological tool in STS and, therefore, within my work I also lean on concepts from other disciplines, where image theory has been established earlier such as in communication science, media and art theory as well as in geography. Basically, I conducted a three-step analysis: first, I focused on the image itself when applying compositional analysis (Rose, 2007). This tool allowed me to describe basic elements of single images but also to focus on different aspects for different types of images, such as scientific ones or the ones from popular media out of databases used by daily newspapers. Subsequently, I looked at the image in relation to other modes, such as the screen for online articles and of course in relation to textual structure. And last, part three which I am still working on covers interactive research on the images used during the case study. Speaking with Gilian Rose this third step reflects on the site in which the image is seen by various audiences (Rose, 2007). Hence, the division of the following chapters reflect on this three-step approach of my analytical practice.

4.1 The Image Itself

The complex entities produced with state-of-the-art visualization technologies such as MRT or PET found during my case study are already extensively processed, analysed and interpreted as well as reduced in size, as the hundreds of single images produced in the course of the study are raw data that are not ready for publication yet. The images visualizing research results on trans* persons, however, follow a different production logic: they are not produced for the purpose of writing the distinct article. Rather they are produced for a certain commercial purpose, such as being part of an image database from which single images can be selected for a particular text. Due to the broad range of different types of images in my material I started with the conduct of compositional analysis in order to identify key elements of the single images (Rose, 2007). It covers aspects of content, colour, spatial organization, light, and the expressive content.

4.2 Images and Other Modes

Since images do not stand per se, but rather are one element in establishing scientific knowledge about hormone treatment of trans* persons, the multimodality of the examined publications – textual, linguistic, spatial and visual resources/ modes used to compose a message, needs to be taken into account. Not merely one mode enacts practices of feminization and masculinization but the interplay of different modes of communication (Jancsary et al., 2015). For investigating images´ capacity to build, establish or transform the social category ´trans*´, I analysed relations between images and text, the multimodal composition of the material at hand and I tried a critical evaluation being guided by my generic thinking of trans* and by the data in front. This critical evaluation is in the center of my analysis and takes place at several points: also,

the aspect "expressive content" in compositional analysis covered a critical evaluation as well as the interactive research in different communities (see also chapter 4.1 and 4.3).

4.3 Talking about images

Whereas John Berger´s art-critical theory on looking at images is rather focused on the relation between the depicted and the person who is looking at it (Berger, 1979), in STS looking at images and talking about it is an integral part of understanding the visual in science, as they are supposed to be carefully used and positioned while writing publications. Uncovering multiple transformations of social categories during image engagement and deployment is difficult if only images are analysed (Burri and Dumit, 2008). So, I discussed images with study authors in the frame of problem-centered interviews and, in a follow-up setting, pre-selected images in the queer STS section of the yearly conference in Graz (Witzel and Reiter, 2012). Talking to different communities is a central part of my research concept, as it is deeply intertwined with the question who is allowed to speak on the behalf of trans* persons (Jancsary et al., 2015).

4.3.1 With Study Authors

Since my interest is not on the image production practice itself, but the work performed in the process of science communication, between February 2020 and June 2021, I conducted problem-centered interviews with the study authors (n=4). I did interviews with researchers from different fields, such as chemistry, psychology and medical science and – due to snowball recruiting practices, researchers from different institutions in different countries, such as the Karolinska Institute in Sweden. Within these interviews, I also discussed visual material on trans* issues produced in different social arenas, such as in film, performance and art. The material covered all the images found during data collection and other media, such as the film "The Ballad of Genesis and Lady Jaye", a report on a transgender designer from the "New York Fashion Week" and a workshop by Diane Tor "Man for a Day" as well as an art piece produced by Jakob Lena Knebl and Hans Scheirl for the Rathausplatz in Vienna.

I mainly asked three questions in the frame of the interview setting:

Question 1: Looking at all these images, which one, do you think, depicts feminization/ masculinization best? And, why?

Question 2: Looking at these images, which one, do you think, depicts being trans* best? Why?

Question 3: Among all these images, please choose the most interesting one. Why did you choose especially this one?

During the STS conference in Graz in May 2023, I was able to discuss two of the popular images used during my case study with the STS community. My presentation took place in the section "Queer fiction and technologies". Since my conference talk was conceptualized as research practice, the images were decontextualized for this purpose. I also presented three questions to the audience, the first two should help validate the visual meaning and the composition of the image but also help to make the audience familiar with the visual material in my case study.

Question1: What can you see on this image? What is on it? What is not visible?

Question 2: What is particular about this image, in terms of body, perspective, colors amongst others?

The latter question aimed at supporting my interpretation efforts of the critical evaluation of the two images.

Question 3: How can you relate this image to trans* persons, to hormone treatment, and in detail to feminization and masculinization?

After the conference I transcribed the answers, interpreted them and analysed them in the context of the other methodological approaches.

5 Results

A first result was that the medical images produced for the purpose of medical publication did hardly travel beyond the scientific realm, in particular travelling of medical images into popular arenas could hardly be observed in my case. They were rather travelling between research fields and topics such as endocrinology, language performance and depression.

The high-dose donation of testosterone was, thus, further discussed as a model for treating depression, whereas the medical images used for scientific publications did not appear in any of the media in non-scientific arenas. Only one article in an Austrian newspaper provided a link to the entire article in scientific media. It seems that every medium follows one´s own image strategy which was a further empirical finding. Therefore, the permeability of science in the case at hand- so far, rather refers to a story than to an image, though the story is based on medical image production and hence, gives power to the words written and the words said. So, the images still unfold- though being absent, their power through providing the stories told with scientific evidence in

popular media. This becomes visible, for instance, through mentioning the technology used for observing trans* brains or for mentioning the number of people being scanned in the popular stories.

For further analytical purpose during the STS conference, I shared two pre-selected popular images during my research talk in order to get further informed interpretation efforts.

5.1 Image 1

I chose the following image for the discussion at the conference because it was an outstanding image in the set of the images used in popular media in a sense of not being a photograph but rather a graph. My assumption was that it could open some space for interpretation.

Figure 1: Image used in the article: How Changeable is Gender? By Richard A. Friedman https://www.nytimes.com/2015/08/23/opinion/sunday/richard-a-friedman-how-changeable-is-gender.html.

Whereas one of the study authors found this a valuable (re) presentation of trans* persons, the queer community at the STS conference rather criticized several aspects of this image. Nevertheless, some aspects brought up complement each other, others contradict each other very clearly, such as seeing one person versus seeing a group of people or seeing two separated characteristics versus several overlaying and concurring characteristics. The invisibility of "others" but also of some sort of a trans* visibility was criticized in the conference setting – what I found especially interesting, as the latter suggests that there is a kind of a single trans* identity.

"What is visible are shapes that through social norms one might identify as an identity but it is not. I cannot see an identity because I cannot be in conversation with these shapes. So, I think what is not visible is exactly *that* identity." (Response 2)

"I see something fragmented and disjointed, and what I don´t see is a sort of sensible whole." (Response 3)

The colors of the picture and also the forms in the image were an issue, the latter were described as "silhouettes", "shades" and "rip figures" for instance. The forms were also interpreted as a metaphor for gender and in this sense criticized to reduce trans* persons to a "trope".

Relating the image to a transition process was not very easy for everyone: one respondent could not relate the image to transition at all, another one saw a "meant" visualization of a transition process. Another respondent saw in this image what the scientists observed with MRT scans, namely that trans* is seen as a middle category. Whereas this position is in the focus of interpretations in both groups, nevertheless, it is differently contextualized. Whereas seeing trans* as a middle category is criticized during the conference, one study author relates to transition as changing the binary coded gender into the desired direction:

"It shows that there is "both" in one person, and especially for trans* persons, it is "just" the wrong body and not yet the desired gender. The female part becoming a male silhouette and vice versa." (Study author 1)

During the conference, exactly this practice of building relations between trans* persons, transitions and binary categories such as sex versus gender and male versus female, (re) presented in the image through high heels, the suit, and, haircuts, was criticized.

"…the picture maybe might *also* (annotation of the author) depict a lot of identity struggles but always in reference to a gender-binary." (Response 8)

5.2 Image 2

The second image discussed during my conference talk was an image that was not easy to interpret during my first analytical step, in particular in the context of the story given in the text. The study authors did not choose this image for further discussion at all. During single image analysis, I could not really make sense of the social characteristics of the depicted person, such as age and gender for instance. The other thing was that the story in the text was about male and female aspects of bad mood, depression, some emotional states. The article was not about feminization, but rather about donating testosterone to trans* men in order to cure depression. So, I decided to present it to peers, but without that background information, title and, context.

Figure 2: Image with the title "Leidende Volksseele: Depression"
© Klaus-Peter Adler / Fotolia, used in the article: "Testosteron als Stimmungsbooster?"
https://kurier.at/wissen/weltweit-erste-studie-testosteron-unterstuetzt-stimmungsaufhellende-antidepressiva/110.330.352

During our discussion the person depicted could also not easily be identified in regard to age and gender:

"I personally see on this picture an upset child, or maybe more an adolescent. I am not good with age. Probably a teenager. So, an upset youth." (Response 10)

"… I think we immediately also ascribe a gender to the picture but maybe we are not sure what gender this person is." (Response 11)

Nevertheless – maybe a bit less surprising in the context of my presentation, the image was contextualized with a wish for change and a transition process:

"… it might be a youth… wanting to change that gender but might experience difficulties in society with it and therefore maybe upset in the context. Or frustrations with the transformation process. …" (Response 10)

Since the gender of this person is not easily accessible we could not see if the discomfort comes from a feminization or a masculinization process. The gender of the depicted person is not visible and not clear, whereas in the text the male way of dealing with frustrations as well as the donation of testosterone, hence masculinization practices, are valued as the more worthy transitions.

One respondent found a communality between the two images presented during my conference talk, namely that none of the persons shown in the images have faces, and found this practice sort of a de-humanizing practice.

"I am personally really struck between the images, how none of them have faces. So, the lack of faces in these images is a de-humanizing process." (Response 12)

Concluding, the answers of the conference participants gave new insights but they primarily served as a tool for validation of the analytical step "the image itself" (see chapter 4.1). This affected in particular the two images selected for presentation at the conference, as their interpretation was not easy in a sense of not being able to describe their expressive content whereas on the other images gender aspects and especially aspects of feminization and masculinization could be much easier explored. It was also surprising that these two images (re) present or tried to (re) present the non-binary aspect of feminization and masculinization which also raised the question if making the non-binary visible is a particularly difficult task for authors in popular arenas.

6 Short Discussion

This paper aimed at giving a detailed view on how I approached images in an STS case study investigating a medical research project on hormone treatment of trans* persons. I tried to establish a critical view on (re) presentations of feminization and masculinization

which demanded- an introduction of theoretical concepts, and the documentation of some methodological practices, including the conference talk at the STS conference in Graz that was conceptualized as a research practice and asked the queer STS community to participate in my research work. So, first, I shortly want to reflect on what happened during the session "queer fiction and technology" and, then, embed the results of the discussion during the conference in the broader discussion established during my analytical work so far.

Against my initial plans, I gave the conference talk online, which is not per se a problem. However, for the interactive part and the discussion of the visual material it was as I could not see the audience but just the screen that I was sharing and the moderators in front of the presentation. I could not see, thus, the faces of the people which, during offline interviews, makes it easier to interpret the words said. I also could only rely on my ears in order to know about social categories of the respondent, such as age and gender. Nevertheless, talking to the technological feminist community, and hence to a professional audience, that is familiar to theoretical concepts of queer and trans as well as of technologies, was extremely valuable for my research work. All the single statements allowed me to advance my analytical work. Methodologically, it was interesting to interact with the bundle of knowledge at the conference section, due to several reasons: dealing with a number of more than 10 images, it can help to investigate why a particular image is chosen for further discussion or not. The more important aspect, though, is the possibility to validate single image analysis- which is often conducted by a single researcher, within the peer group. At the same time such a procedure has the capacity to support further exploration of the image selected for discussion and, hence, reduce its interpretative flexibility.

So far, the visual analysis in my case study could show how valuable the analysis of non-human actors can be for my research purpose. Analysing the use of images in a research project on hormone treatment relates scientific with non-scientific products, knowledge, and practices. While several authors in STS emphasize different mobility aspects of images between scientific and non-scientific arenas (Dumit, 1999), in my case study imaging practices are rather tied to the publishing media than to images that travel. Nevertheless, images allow scientists to move between different research issues and disciplines, such as endocrinology, language research and depression (Beaulieu, 2001). This aspect still demands in depth analysis, as the latter can be viewed as the biomedical gaze on masculinization, in particular on the donation of testosterone as a treatment model for depression. Though this story travels in popular media through the textual mode, it is not necessarily reflected in the images used.

Medical images are objectified in a complex negotiation process, at whose end is the minimization of the interpretative flexibility of the images (Amann and Cetina, 1988).

However, for the popular images in my sample it turned out that they are in some regard open for interpretation. As I showed in the results section, images used in the context of reporting a research project on trans* persons might, when showing the same picture to different people, be interpreted in distinct ways such as a middle category of the binary or as de-humanizing. Due to the results at the conference, which strengthened the aspect of interpretative flexibility of images, it is even more valuable to still do interpretation sessions with trans* persons.

References

AMANN, K. & CETINA, K. K. 1988. The fixation of (visual) evidence. Human Studies, 11, 133 - 169.

BEAULIEU, A. 2001. Voxels in the Brain:Neuroscience, Informatics and Changing Notions of Objectivity. Social Studies of Science, 31, 635-680.

BURRI, R. V. 2012. Visual rationalities: Towards a sociology of images. Current Sociology, 60, 45-60.

BURRI, R. V. & DUMIT, J. 2008. Social Studies of Scientific Imaging and Visualization. In: HACKETT, E. J., AMSTERDAMSKA, O., LYNCH, M. & WAJCMAN, J. (eds.) 3. ed. ed.: MIT Press.

COLEMAN, E., RADIX, A. E., BOUMAN, W. P., BROWN, G. R., DE VRIES, A. L. C., DEUTSCH, M. B., ETTNER, R., FRASER, L., GOODMAN, M., GREEN, J., HANCOCK, A. B., JOHNSON, T. W., KARASIC, D. H., KNUDSON, G. A., LEIBOWITZ, S. F., MEYER-BAHLBURG, H. F. L., MONSTREY, S. J., MOTMANS, J., NAHATA, L., NIEDER, T. O., REISNER, S. L., RICHARDS, C., SCHECHTER, L. S., TANGPRICHA, V., TISHELMAN, A. C., VAN TROTSENBURG, M. A. A., WINTER, S., DUCHENY, K., ADAMS, N. J., ADRIÁN, T. M., ALLEN, L. R., AZUL, D., BAGGA, H., BAŞAR, K., BATHORY, D. S., BELINKY, J. J., BERG, D. R., BERLI, J. U., BLUEBOND-LANGNER, R. O., BOUMAN, M. B., BOWERS, M. L., BRASSARD, P. J., BYRNE, J., CAPITÁN, L., CARGILL, C. J., CARSWELL, J. M., CHANG, S. C., CHELVAKUMAR, G., CORNEIL, T., DALKE, K. B., DE CUYPERE, G., DE VRIES, E., DEN HEIJER, M., DEVOR, A. H., DHEJNE, C., D'MARCO, A., EDMISTON, E. K., EDWARDS-LEEPER, L., EHRBAR, R., EHRENSAFT, D.,

EISFELD, J., ELAUT, E., ERICKSON-SCHROTH, L., FELDMAN, J. L., FISHER, A. D., GARCIA, M. M., GIJS, L., GREEN, S. E., HALL, B. P., HARDY, T. L. D., IRWIG, M. S., JACOBS, L. A., JANSSEN, A. C., JOHNSON, K., KLINK, D. T., KREUKELS, B. P. C., KUPER, L. E., KVACH, E. J., MALOUF, M. A., MASSEY, R., MAZUR, T., MCLACHLAN, C., MORRISON, S. D., MOSSER, S. W., NEIRA, P. M., NYGREN, U., OATES, J. M., OBEDIN-MALIVER, J., PAGKALOS, G., PATTON, J., PHANUPHAK, N., RACHLIN, K., REED, T., RIDER, G. N., RISTORI, J., ROBBINS-CHERRY, S., ROBERTS, S. A., RODRIGUEZ-WALLBERG, K. A., ROSENTHAL, S. M., SABIR, K., et al. 2022. Standards of Care for the Health of Transgender and Gender Diverse People, Version 8. International Journal of Transgender Health, 23, S1-S259.

DUMIT, J. 1999. Objective Brains, Prejudicial Images. Science in Context, 12, 173-201.

FAULKNER, W. 2001. The technology question in feminism: A view from feminist technology studies. Women's Studies International Forum, 24, 79-95.

HARAWAY, D. 1991. "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century," in Simians, Cyborgs and Women: The Reinvention of Nature, Routledge.

JORDANOVA, L. 2004. CHAPTER SIXTEEN. Material Models as Visual Culture. In: SORAYA DE, C. & NICK, H. (eds.) Models. Redwood City: Stanford University Press.

JOYCE, K. 2005. Appealing Images:Magnetic Resonance Imaging and the Production of Authoritative Knowledge. Social Studies of Science, 35, 437-462.

KRESS, G. R. & VAN LEEUWEN, T. 1996. Reading Images: The Grammar of Visual Design, Routledge.

LYNCH, M. 1985. Discipline and the Material Form of Images: An Analysis of Scientific Visibility. Social Studies of Science, 15, 37-66.

LYNCH, M. 1988. The Externalized Retina: Selection and Mathematization in the Visual Documentation of Objects in the Life Sciences. Human Studies, 11, 201-234.

ROSE, G. 2007. Visual Methodologies: An Introduction to the Interpretation of Visual Materials, SAGE Publications.

STURKEN, M. 2001. Practices of looking : an introduction to visual culture. In: CARTWRIGHT, L. (ed.). Oxford ; New York :: Oxford University Press.

WITZEL, A. & REITER, H. 2012. The Problem-Centred Interview: Principles and Practice. London.

How to Turn Words into Action?
Status of the Implementation of Intersectionality in Gender Equality Work in German Research Organizations

Corinna Pusch[1] and Ulla Weber[1]

[1]Central Gender Equality Office, Max-Planck-Society, Germany

Abstract. In May 2022, the team of the Central Gender Equality Officer of the Max Planck Society conducted a survey among German research organizations to determine the state of implementing intersectional approaches in their gender equality strategies. This article gives an overview of the results of the survey to ascertain what is needed to drive the implementation of intersectional gender equality strategies in the German scientific landscape a decisive step forward. The results show that there are single pioneer organizations that provide convincing examples of good practice. Apart from that, the concept hardly seems to be implemented in practice. Above all, it becomes clear that the concept of intersectionality is characterized by mystification, misunderstandings and a mismatch of requirements and resources available to gender equality agents. After contrasting these difficulties with the strategies used in good practice from pioneer organizations, we make suggestions for alternative approaches on how to overcome the concrete challenges observed in the survey. As a conclusion we suggest counteracting the overburdening of gender equality agents by de-mystifying the concept, understanding it as an analytical tool more than a completely new strategy and pursuing a gradual change based on a further professionalization of intersectional gender equality work - and above all by working together to ensure the necessary resources for this professional work.

1 Introduction

"I'm surprised that in the many years that intersectionality has been talked about and researched, so little usable knowledge has been produced that we can use to take action at the base (ID 455[68])[69]."

---

[68] Answers that were originally given in German, have been translated by the authors with the help of DeepL.

[69] As references for the survey answers we use the automatically generated answer-IDs created by Lime Survey.

"Intersectional" is the current buzzword that signals that a Gender Equality Plan or Concept is state of the art. The idea is to illuminate blind-spots in gender equality strategies, address multiple discrimination and different needs in gender-homogeneous groups and to consider how discrimination mechanisms regarding different diversity categories interact, stabilize and amplify each other. But while the added value of this approach is largely undisputed, many questions still seem to be unanswered or answered in very different ways: What does an intersectional gender equality strategy mean in practice? Which target groups should be considered and on what basis is this decided? Is it necessary to collect data on the prevalence of certain combinations of personal attributes for this purpose, and what if this is not possible? Does data protection make us unable to take action? Does specific group targeting stigmatize more than it helps? And if promoting women did not fit into science's understanding of excellence, how could promoting even more specific, smaller groups? What does a practical and feasible intersectional gender equality measure look like? And what effects do these measures have?

2 Methodology

2.1 Research Question

Based on a survey among gender equality agents, this article explores how far the implementation of an intersectional approach in gender equality work has come in German research organizations. Following the diagnosis of a low level of implementation in most of the organizations, we will try to find answers why that is, what hinders implementation and which steps and strategies could remedy this lack of progress – based on the survey but also on literature and our own experiences as gender equality practitioners.

2.2 Terms

2.2.1 Intersectionality

In this text we follow the definition of Crenshaw (1989): "Intersectionality is a metaphor for understanding the ways that multiple forms of inequality or disadvantage sometimes compound themselves and create obstacles that often are not understood among conventional ways of thinking." Discrimination based on two or more diversity categories at the same time is recognized as a unique experience that cannot be described by the simple addition of two or more forms of discriminations based on only one category.

Furthermore, it is recognized that discriminatory systems, like sexism, racism, ableism and so on, are not separate phenomena, but are fundamentally interwoven, mutually dependent and stabilize each other.

Accordingly, in gender equality work, following EIGE (2023b), we understand intersectionality as an

"Analytical tool for studying, understanding and responding to the ways in which sex and gender intersect with other personal characteristics/identities, and how these intersections contribute to unique experiences of discrimination."

The terms below have been defined by the authors themselves. We have not found any common terms in use that would have fit our concept of analysis[70], which is why we created them, specifically for clarity in this article:

2.2.2 Intersectional Gender Equality Work or Measures

Intersectional gender equality work for us is an approach which aims for gender equality by applying an intersectional perspective in all its elements, like gender monitoring/data collection, data analysis, definition of target groups and objectives, as well as measure design and evaluation. Its target group is any person for whom gender is one of the aspects of their discrimination experience. We use the terms "intersectional gender equality measures", "intersectional gender monitoring" accordingly. These terms are used when we want to point out that an intersectional approach is applied. We want to point out that this term for us is inseparably connected to the definition of intersectionality above, especially in regarding mechanisms of intersectional discrimination as unique and not only as an addition of two or more distinct forms of discrimination and in acknowledging the interwovenness and mutual stabilization and amplification of discriminatory systems. Thus, additive concepts of intersectionality are explicitly not meant here (see Diversity Equality Measures).

We however want to make transparent that there are other authors who argue that concepts of intersectionality with a constant focus on one diversity category, in this case "gender", are inherently additive. According to Christofferson (2021) this understanding of intersectionality follows a "Diversity within"-concept, which means that "a particular strand remains the focus, and is viewed implicitly or explicitly as more important than others" and as such is inherently additive instead of truly intersectional. In Christoffersen's description this approach also regards intersectionalities as not always but only relevant in certain cases (Christoffersen 2021, p. 9). We would argue however

---

[70] In the publication by the European Commission 2022 for example the term "Gender+ Actions" is used for measures that address mainly but not only the category gender, but it is not distinguished between measures that target the addressed categories as intersectionally interacting or simply as existing side by side – a differentiation we need in this article.

that there is a difference between having one "strand" (Christoffersen 2021) or, as we call it, diversity category as a constant focus and regarding it as generally more important than others. And that a constant focus also does not necessarily mean to have an additive understanding of intersectionality or to believe that intersectionality is only relevant in certain cases. It can instead also mean to have a main focus on situations in which gender is one factor among equally important factors in a unique situation of interacting privileges and discriminations and to be aware of the interwovenness and mutual stabilization of different forms of discrimination. Which makes solidarity and allyship among equality actors with different focuses essential.

This is in order to make clear the concept of intersectionality, which we have in mind in this text. Regarding the measures and strategies reported by the practitioners in our survey, in most cases we cannot determine which underlying concept of intersectionality they exactly base their work on, as long as it addresses or involves target groups discriminated on the basis of more than one diversity category at the same time.

2.2.3 Gender-only Equality Work or Measures

This term is used specifically in contrast to intersectional gender equality measures and means measures that only consider and aim at gender as a diversity category.

2.2.4 Diversity Equality Measures

In this text we use the term "diversity equality measures" in contrast to intersectional measures, to signify measures that aim at two or more diversity categories, but independently, not specifically considering their intersectional interwovenness. This is just a theoretical construct. In practice it is often hard to draw a line between consideration and non-consideration of intersectionality. The complexity in drawing this line is for example shown by Christoffersen (2021), who has created a category of "applied concept" of intersectionality, which is called "multi-strand intersectionality" and is similar to our concept of "Diversity Equality Work/Measures". It addresses "equality strands in parallel, separately yet simultaneously" (p.8) and has an "additive understanding of intersectionality" (p.9). At the same time, just like us, they argue that this concept "be *disassociated* from 'intersectionality'" (p.4).

2.2.5 Gender Diversity Measures

We use the term "gender diversity measures" for any gender equality measures that explicitly regard there being more than two binary gender identities. This could be seen as self-evident and not needing an extra term, when recognizing gender per se as diverse and/or a continuum, but for the cause of this article we will need to make the distinction particularly visible.

2.2.6 Research Organizations

We use the term "research organizations" as an umbrella term for any institution in which research is performed, specifically universities as well as non-university research organizations.

2.3 Literature Use and State of Research

The topic of practical intersectional gender equality work in German research organizations is only very scarcely addressed in scientific literature so far. Discussions about what the concept of intersectionality means for feminist theory and practice however informed this article (e.g. Kurz 2022; AK ForschungsHandeln 2015; Do Mar Castro Varela, M. and Dhawan, N., ed., 2011) as well as literature on diversity equality work in research organizations, which also makes use of the concept of intersectionality (e.g. publications in Darowska 2019). For the topic of this article specifically we were able to find merely two publications: They were originally presented and referred to in the context of the annual conference of the bukof (Federal Conference of Women's and Gender Equality Officers at universities in Germany) in 2022 with the topic "Gender Equality unites – Allyship in intersectional gender equality work.". These works are Bitzan and Pöllman-Heller (2015) on intersectional gender equality work at technical universities in the STEM-field and Brötzmann and Pöllmann-Heller on intersectional approaches to support women at universities of applied sciences (2020). Overall, this shows that in the German landscape there is a severe lack of published materials that could guide practical intersectional gender equality work. This corresponds also to our survey findings. The relevant material we could to find was used to discuss the results of our survey - directly in each of the thematic sections.

At the EU-level, namely in the 2020 Communication "A new ERA for Research and Innovation", the European Commission explicitly aims for an intersectional approach in gender equality policies. The need for an „opening […] to intersections with other social categories, such as ethnicity, disability […] and sexual orientation" is diagnosed and the goal of developing "inclusive gender equality plans" is thus formulated (European Commission 2020a). Accordingly, materials have been published on "inclusive gender equality plans" in the last years: the new approach is mentioned in the GEAR tool by the European Institute for Gender Equality (EIGE 2023c) and most importantly a brochure on "Approaches to inclusive gender equality in research and innovation" (European Commission 2022) has been published which collects practical implementation examples from research organizations. However, though referring to the concept of intersectionality, the criteria for the choice of these examples do not necessarily follow an intersectional approach according to the scholarly definition we use for this article.

The brochure contains merely so-called Gender+-actions, which address gender and other dimensions, but not necessarily in intersection with each other, and so-called EDI approaches which foster equality, diversity and inclusion in a general way without addressing certain target groups. The measures in the first as well as in the second category can have an intersectional design, but only few of the examples in these categories in the brochure explicitly have. The discussion of the examples and strategies in the brochure seems unclear regarding the definition of the term "inclusive gender equality plans" and if and how exactly an intersectional approach is necessarily a part of it. Thus, we do not regard it as sufficient information on how to practically implement intersectional gender equality work. In our opinion the material can even be potentially confusing for inexperienced practitioners on what intersectionality or intersectional gender equality work exactly means. There are several insightful thoughts on aspects of intersectional approaches in the brochure however, which we used for this article.

There is a publication on the divergence of concepts of intersectionality, based on the understandings of intersectionality by gender equality practitioners in the UK - a phenomenon we, too, observe in the EU materials as well as in our survey results. Christoffersen (2021) finds five significantly different understandings of the concept, which they elaborate based on actual practices as well as practitioners' reports on their practices. Three of the found concepts differ from scholars' definition of intersectionality and should be disassociated with the concept, Christoffersen argues. Additionally, they find discrepancies between the reported and actually practiced concept of intersectionality (p. 3,4). Risks and chances of the different concepts as well as the effects of such a heterogeneous understanding of the concept are also discussed by Christoffersen (2021).

2.4 Our Position

As gender equality practitioners in a nationally and internationally renowned non-university research organization with regular participation in EU-funded projects, we try to stay up to date in the scientific discourse on gender equality – especially regarding practical gender equality work. It is also our aim to feed our practical experiences into the discourse and produce and share knowledge that from our experience is needed for practical gender equality work in research organizations. This means that this article is not only grounded in the survey results and in literature by other authors but also in our everyday experience and the resulting everyday life theories. This is made transparent wherever it applies.

2.5 The Survey

2.5.1 Intention and context

The motivation for creating a survey on the status of implementation of intersectional gender equality work in German research organizations was our observation that the concept of "intersectionality" is a big part of the current discourse in the German field of gender equality work and actors largely agree that it is an important and valuable concept - but there are only few examples of practical implementation and only few practice-oriented materials available. Thus, our intention was to get a data-based overview of the actual level of implementation, to find out about hindering factors and to ultimately contribute to the development and availability of knowledge on good practices and strategies in the field.

2.5.2 Questions

The survey asked, which other categories of difference were used in gender equality work in combination with gender, which basis these categories were defined on, if data collection is done for these categories – in combination or besides gender – and if the objectives and measures of the organization's gender equality strategy are designed intersectionally. Furthermore, it collected descriptions of intersectional gender equality measures and inquired about problems and challenges of intersectional gender equality work.

2.5.3 Technical details

The survey was provided in a German and English. The English version was targeted at Gender Equality Actors without profound German language skills, mainly from the scientific field. We used LimeSurvey, hosted on our own Max Planck servers. The survey invitations were sent out in May 2022. The target group of the survey were persons in charge of gender equality policies in research organizations in Germany. Inside the Max Planck Society the survey was distributed to the Gender Equality Officers of the Max Planck Institutes. Other non-university research organizations were targeted through the AGbaF – Alliance of Gender Equality Officers of non-university. The gender equality actors of universities were contacted through a mailing list of the bukof – Federal Conference of Women's and Gender Equality Officers of universities. The people who were contacted were accordingly those who were most networked with other organizations. This fits our aim of evaluating the state of implementation and state of knowledge in the German landscape of gender equality work in research organizations. Overall, the survey invitation was sent to 745 gender equality agents in German research organizations. The response rate was 5.6%, considering the 48 questionnaires that were

completed in full (29 by university representatives and 17 by colleagues from research organizations). Another 116 incomplete answers were received, but not counted for the quantitative results. The open text-answers of the incomplete submissions were, however, used in order to better understand the problems involved with implementing the concept and possible issues with answering the survey questions. We interpret the relatively low response rate and the high rate of non-completed surveys as firstly a symptom of our overall findings of a low implementation rate of intersectional gender equality work, which would lead to the fact that people feel that they cannot answer the questions (profoundly). A second possible reason could be the relatively high effort which was required to answer certain questions, especially in the second half of the survey. One of them required for example to list all intersectional measures in the organization and quickly describe each of them. This could have let persons to quit during the survey due to time constraints. Thirdly, we have to consider that there was critical feedback regarding the comprehensibility of the survey: three persons missed explanation of certain terms used (ID 419, 518, 572), one person stated that they found a part of the questions hard to answer (ID 569), another that the questions from her point of view were not clear enough (ID 518). We have to consider this when speaking about limitations of the survey and further research desiderata.

2.6 Data Analysis

In addition to the statistical analysis of the quantitative survey results, we applied the method of structuring content analysis according to Mayring (2019) to the open text answers and the comments collected in the survey, using an inductive approach in forming the system of categories out of the data itself. We then attributed all open-text answers to the developed categories. Subsequently we used the few existing literature on the topic to confirm, question or to bring more details or a different perspective to our results.

2.7 Limitations

The following limitations of our results have to be considered: Due to the low density of data in a part of the categories, some of the results can only be seen as data-based assumptions. We made this clear in the formulation of the results. Some of the discrepancies between targeted content of answers and actual answers, especially when it comes to understandings of intersectionality, might have resulted from misunderstandings of the questions, as already explained in 3.5.3 Technical details. We also discuss this in our results, especially when considering a possible lack of knowledge on the side of the respondents. In order to counteract these limitations and reach a better validity of data, a research desideratum would be to test our results in group discussions with gender equality practitioners.

3 Results: Overview

According to the survey results, categories of difference considered in gender equality work – in combination with gender - by at least half of the participants are "scientific vs. science-supporting personnel" (79%), "sexual orientation" (71%), "age" (63%), "ethnic diversity" (58%), "disability and impairment" (58%) and "social origin" (58%). "Religion" (38%) and other categories (specified by the participants: "care obligations", "physical characteristics like height and weight", "language", "position in the organization") were less frequently named.
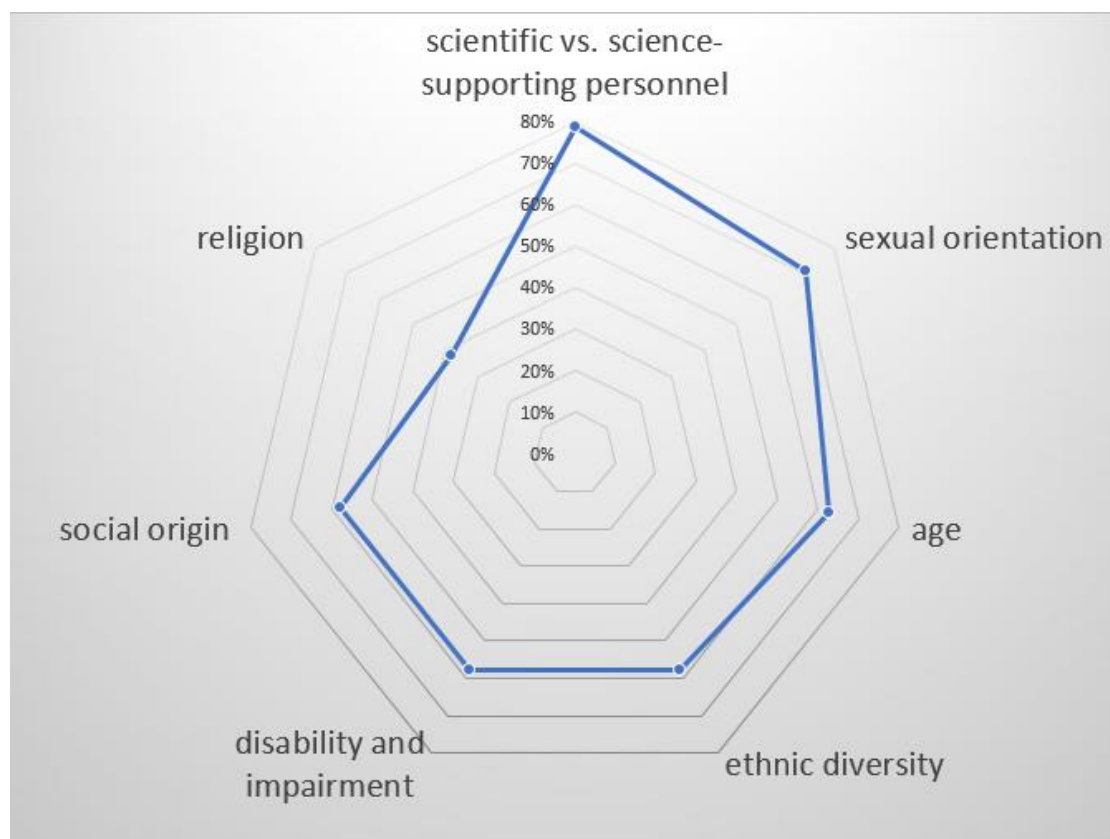
Figure 1: What personal and social characteristics as reasons for privilege and discrimination do you integrate into your gender equality work?

The selection of the target groups of gender equality work is in the majority of cases done in a top-down, non-data-based approach: it follows the understanding of diversity defined by the organization (54%), commonly known diversity categories (48%) or categories of the German General Equal Treatment Act (AGG) (42%). Practicability was another prominent reason for the choice of categories (31%), still with more mentions than analysis of the staff (27%). Other basis for the selection included "previously neglected talent pools" (21%) and further elements (19%), among others "literature", "need-based selection", "self-reporting", "observations" and "task sharing with other entities".
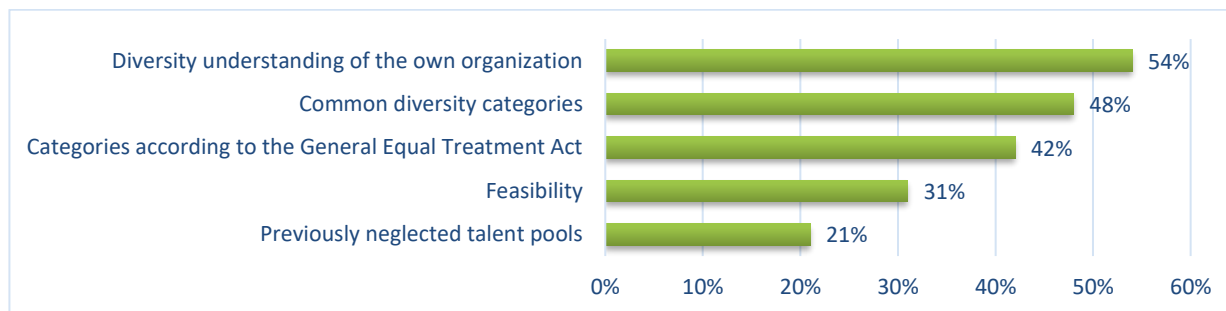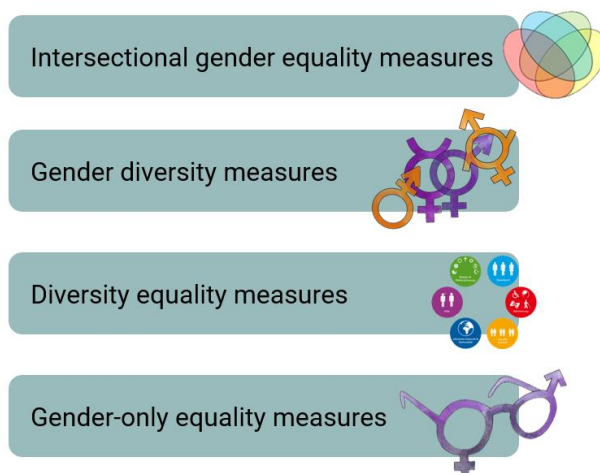
Figure 2: How did you select the target groups?

Correspondingly, 49% of the participants say that they do not collect data on the categories of difference that they consider in combination with gender, while 23% do collect this data connected with gender and 11% independently from gender. 31% of the participants say that the objectives of their organizations' gender equality strategy follow intersectionally-defined objectives, while almost half of them say that intersectionally-designed measures are part of their gender equality strategy. Several statements make it clear that in many cases the organizations are still in the process of determining needs and target groups for intersectional gender equality work (IDs 233, 359). The intersectional design of gender monitoring, if it is considered at all, is also still in the design phase (ID 572). In analyzing the results of the questions on intersectional objectives, measures and monitoring, it has to be considered that the validity of the answers to these specific questions cannot be regarded as high, due to the fact that during the further analysis of the data, it became clear that a considerable part of the participants does not seem to share the common understanding of intersectional gender equality work (see also chapter 2 for definitions). This became clear especially in the survey question on intersectionally-designed gender equality measures: 22 out of the 36 reported measures – as far as we could tell from the entered information - do not meet the common definitions of intersectionality (see chapter 4.4). Instead, we would categorize them as gender diversity measures, diversity equality measures or gender-only equality measures according to the terms and definitions as explained in chapter 2. The 14 measures that corresponded to common definitions of intersectionality were submitted by only eight of the 48 survey participants.

Yes, independently from the category gender
Yes, in connection with the category gender
No
Other
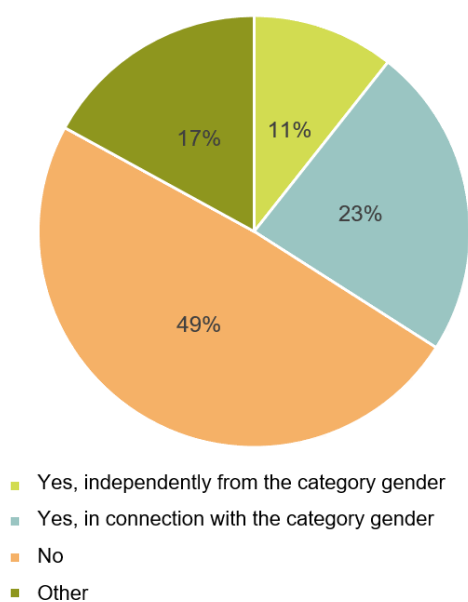
Figure 3: Do you collect data for the characteristics being considered?

Figure 4: Categorization of submitted measures

Overall, we thus see a low level of implementation of intersectionality in practical gender equality work in German research organizations. This corresponds with the European Commissions (2022) findings that "in Europe actions that address characteristics other than gender are in the early stages of development" (p.6), that "statements relating to equality and diversity, particularly among RFOs and RPOs were not always supported by clearly identifiable actions" (p.34) and that "Intersectionality was acknowledged as a concept and in general terms […], but it was less significant or explicit in the actual design of actions" (p. 35).

The last question of our survey was on challenges and problems of intersectional gender equality work, in open-text format. The answers – in combination with open text comments to other questions – will be used in the following to answer our central question: Which are the obstacles that lead to the current lack of implementation of an intersectional approach in practical gender equality work? And what is needed to overcome them?

4 Results: Challenges and Problems of the Implementation of an Intersectional Gender Equality Strategy

4.1 Data Availability versus Demand for Evidence-based Approach

A major issue that hampers the implementation of intersectional gender equality strategies in research organizations in Germany seems to be the low data availability. The quantitative survey results show that 49% of the participants do not have any data available on the categories of difference they consider in combination with gender (see Fig. 2). The open-text answers on challenges and problems of intersectional gender equality work confirm that this is a dominant problem: difficulties in collecting data are the most mentioned item in this section. As reasons the participants mention the small data samples that result from the intersectional combination of categories of difference. This leads to problems in statistical relevance as well as in anonymization and hence data protection (IDs 179, 242, 263, 272, 419, 572). This problem is even more relevant in small organizations (ID 572). At the same time, it seems to be clear for the agents that a data-based status quo assessment is a prerequisite of gender equality work: "Until we know about possible problem areas, needs or structural problems, we can hardly continue to work." (ID 89). It becomes clear that the gender equality agents would like to act but are thwarted by the lack of data (ID 71). This result makes sense: the necessity to collect data as one of the first steps of designing a gender equality strategy (e.g., written down in a gender equality plan), be it intersectional or not, is conveyed by all common literature and manuals on the subject, such as for example the well-known GEAR-tool by EIGE (EIGE 2023a). Additionally, the research project „MINT-Strategien 4.0 – Strategien zur Gewinnung von Frauen für MINT-Studiengänge an Hochschulen für angewandte Wissenschaften[71]", one of the few works that discuss practical issues of the implementation of an intersectional approach in gender equality work, stresses the importance of data collection as the basis of target group selection (Brötzmann and Pöllmann-Heller 2020). But which work-arounds do the gender equality agents then choose for their selection of intersectional target groups? Only one participant reports that an alternative way of data collection was used: documenting the needs that were expressed by participants of a mentoring program (ID 263). In most of the other cases the definition of target groups is instead done non-data-based and top down, as already presented in the main results: the target groups are defined according to the diversity understandings of the organizations, or the German General Equal Treatment Act or simply based on common diversity categories. This could be a typically German

---

[71] "STEM-Strategies 4.0 – Strategies for the recruitment of women in STEM-degree programs at universities of applied sciences" (translated by the authors)

phenomenon, as also Kaufmann (2019) states that diversity processes in German universities were initiated not as bottom-up processes from grassroots movements but from the level of university management and research funding organizations, in projects such as "Vielfalt als Chance" ("Diversity as a Chance") in the year 2010 or the project "Ungleich besser!" ("Better not the same!") by the Stifterverband Deutsche Wissenschaft (Donors' Association for German Science).

4.2 Overburden of Gender Equality Agents

Also apparent from the open-text answers of the survey are considerable demands of an intersectional gender equality strategy that tend to overwhelm and overburden the gender equality agents. Most answers connect this to the complexity of the concept, e.g. "There are many many dimensions to consider and they are never discrete." (ID 452), "Difficulty in focusing on topics, working in a focused and goal-oriented manner" (ID 560), "Higher complexity also means more difficult to objectify the criteria" (ID 575). Other reasons mentioned are that the "normal" gender-only equality work is already very difficult and has been met with resistances so that the development towards an intersectional approach is not imaginable or feasible (IDs 467, 416). Furthermore, there is a lack of resources for gender equality work (IDs 254, 263, 335, 503, 560), a lack of expertise and good practice examples (IDs 455, 575) and the awareness-raising for other categories than gender has to start from scratch (ID 263). The lack of sufficient data to identify specific target groups also contributes to the strain on the gender equality agents by making it difficult to "to set thematic priorities" (ID 560) and to weigh up the different categories against each other. The problem of defining categories, between the risk of exclusion on the one hand and arbitrariness on the other, has been widely discussed, e.g., in Kurz (2022, pp.56-58). Besides this obvious complexity, we will, in the following, dive deeper into the background of why intersectional gender equality work is overwhelming and difficult for many gender equality agents to implement and what this has to do with the current practices and structures in gender equality work in Germany.

4.3 Routines Shaken: Clash with the Established Gender Equality Work

It becomes clear that the development towards an intersectional gender equality work means to question former matter of course-routines. The **clear separation of agents and responsibilities** in organizations is challenged – as intersectionality forms a starting point for transgression of distinct limits between the categories. For the gender equality agents this process is very challenging – especially on the background of already scarce resources and sometimes lack of support by the leadership, seen in the survey through the participants' report of responsibility being clearly separated between agents, of distribution struggles, of safeguarding of vested rights and resources (IDs 575, 161), of

competing demands (ID 98) and of even being played off against each other by the leadership (ID 338) and therefore an unwillingness to cooperate. We see a fear that the "classical" or gender-only equality work could suffer in the process of adopting an intersectional approach. It could be "blurred" (ID 317) or „diluted" (ID 512); the basics could be „lost sight of" (ID 464). The authors of the "MINTersectionality" study from 2015 received similar results on worries and conflicts regarding the potential connection between gender and other categories of difference in their survey among gender researchers and gender equality agents. The results were consequently discussed with gender equality agents in a workshop. Most of the participants were in favor of an integration of gender and diversity, but according to them, the risk of the category gender fading in the background should be counteracted and gender equality agents should not be obliged to take on diversity work additional to their legally defined duties, especially not without additional resources (Bitzan and Pöllman-Heller, 2015, 20 - 22).

Some gender equality agents also fear that identifying and targeting intersectionally-discriminated groups could result in **reproducing stereotypes and stigmatizations** - by stressing the differences between the groups (IDs 524, 419, 578, 548). One of the participants is convinced that explicit addressing of a group affected by multi-discrimination is counterproductive (ID 455). Another stresses that this is a general dilemma of their work: "Characteristics that we want to 'overcome' must be 'emphasized' in our work [...]" (ID 548). The worry about the potential of stigmatization in the context of intersectional approaches has also been expressed by "many" (Bitzan and Pöllmann-Heller 2015, p.12[72]) of the researchers and gender equality agents, that participated in the "MINTersectionality" study. The results of the "MINT-Strategien 4.0" study also specifically discusses this dilemma and therefore calls for an approach to diversity, that is "reflexive, sensitive to differences and inequalities" (Brötzmann and Pöllmann-Heller 2020, p.11). Interesting to us is that the dilemma of dramatization of categories and differences in gender equality work as well as in diversity equality work is well-known in the German professional discourse and the strategies of dramatization, de-dramatization and non-dramatization are discussed as vital parts of one common approach. In this context each of the strategies is acknowledged to have its time, place, and purpose. Generally, there seems to be a common agreement that in fields lacking awareness for a certain kind of discrimination and bias, dramatization is the first step which cannot be left out and lays the basis for a more equal working culture that then can also benefit from strategies of de- and non-dramatization. Part of this discourse also involves strategies on how to deal with the inherent risks of the strategy (e.g., Debus 2012). That this discussion has been renewed in view of intersectional gender equality work confirms once more that routines seem to have been fundamentally shaken and that the approach

---

[72] Citation from German publications has been translated by the authors with the help of DeepL.

is seen not only as gradual, but fundamentally new, and that all former assumptions tend now to be questioned. This tangibly explains why the approach is such a challenge for gender equality agents.

In this context not only the basic tools of gender equality agents, but their very **self-conception seems to be challenged**. We can already see hints to that in the survey. It begins with an insecurity, whether an intersectional approach is covered by the legal basis of gender equality work in German research organizations (IDs 158, 230, 233, 572, 575). Furthermore, the gender equality agents question whether an intersectional approach fits with the conception and/or the name of their office (IDs 71, 158). This leads to a general uncertainty regarding the implementation of the concept. In our opinion, this insecurity is not (only) a question of formality and law, but originates from a fundamental questioning of the conception of the political subject "woman" and the development from a formerly explicit or implicit affected-persons approach (as most of the gender equality agent themselves in Germany are women) to making politics for and representing interests also of groups differently positioned than the gender equality agents themselves. This fundamental change is also discussed in German gender research literature as the "question of the (im)possibility of a collective feminist we" (Kurz 2022, p.75): Is it possible for intersectional feminist approaches to emphasize differences of women but still reference 'women' as a collective? "Or is it instead a political, ideological 'we' that is based on shared goals rather than shared identities or experiences [...]?" (Kurz 2022, p.76) What becomes apparent are the "challenges for privileged women*" (Kurz 2022, p.96) in the effort for intersectional feminist action. She references a study by Schuster 2016, which elaborates that "intersectional expectations" (Schuster 2016, p.4) put lots of pressure on privileged women to consider differences between women and reflect their own positioning, while it remains largely unclear how to put these expectations concretely into practice. Reflecting on this result, Schuster summarizes that "intersectionality should not be fetishized to such an extent that young feminists become too afraid to act collectively" (Schuster, 2016, p.6), while of course not giving up to consider needs of less privileged groups. At the same time, the necessity of reflecting one's own standpoint and involvement in the reproduction of inequalities and social positioning in society is stressed as a prerequisite for diversity sensitive action throughout literature in the field (e.g. Smykalla & Vinz 2011; AK ForschungsHandeln 2015, do Mar Castro Varela & Dhawan 2011). In summary, we can say that the goal of adopting an intersectional approach in gender equality work leads gender equality agents not only to question their strategies and tools, and the self-conception of their roles but also their view of the world that has been shaped by their upbringing and development within a certain societal position – even more than their gender-only equality work might have already done before.

4.4 Lack of Professionalization of Intersectional Gender Equality Work

Besides obviously great challenges produced by the approach of intersectionality per se, we also see limiting factors that originate from the lack of professionalization in how these challenges are met in the German research organizations.

One participant addresses these limits very frankly when asked about problems and challenges of intersectional gender equality work: "Gender equality work takes place primarily on a voluntary basis - a wide range of tasks cannot be fully performed, professionalization can only be achieved up to a certain limit in a voluntary position, this may not be sufficient." (ID 335) Many other participants confirm that a lack of personnel resources is an important problem regarding the implementation of intersectional gender equality work (IDs 254, 263, 335, 503, 560). We cannot tell if these were also submitted by gender equality agents that rely only on voluntary work.

In connection to the lack of personnel resources, the participants criticize that the structure of responsibilities in their organizations is not fit for intersectional work: the designation of responsibilities for different diversity categories is either clearly separated and cooperation is difficult, or there are no persons responsible for other categories than gender (or mostly disability). Furthermore, there seems to be resistances to change, either from the leadership or from the agents themselves (IDs 338, 569).

Many obstructing aspects we see in the survey, such as a lack of common understanding and knowledge, a lack of good practices and materials and a lack of agreement regarding the legal basis of an intersectional approach, could originate in or at least be related to that lack of resources and sufficient professional structures: the work is done to always "'just fill the gaps' - comprehensive intersectional work is not possible due to resource constraints" (ID 263).

A striking result from the survey is that many of the gender equality agents do not seem to share, know about or follow common definitions of intersectionality in answering the survey questions. 22 out of the 36 reported measures, when asked about "measures designed to be intersectional", do not contain any intersectional element – at least apparent to us from its description. Two other categories of measures are reported here in particular: Gender diversity measures, so measures that are designed or open for persons of other genders than cisgender women and/or men, and diversity measures that have elements considering categories of difference other than gender, but not in combination/interaction with gender.

We must consider that probably not all survey participants who submitted measures, which did not meet the criteria of intersectionality, actually do not know about common definitions of intersectionality. It might also be a problem of not understanding the question or not being motivated to follow the instructions properly. There were also three

comments to the survey which stated that the questions were hard to answer (IDs 419, 569) and one that a definition of "intersectional gender equality work" would have been useful (ID 419). These were not, however, participants that submitted non-intersectional measures and this presumably does not explain why over half of the answers do not meet the criteria. In combination with answers that mention a lack of knowledge and expertise as one of the problems and challenges of the implementation of intersectional gender equality work (IDs 263, 335, 407), or the lack of experience and good practice examples (IDs 71, 455, 575), we can say for sure that there is a considerable backlog in the expertise needed to successfully design and implement an intersectional approach in gender equality work. The survey result on the legal basis of intersectional gender equality work supports this hypothesis: One participant is convinced that financial resources from a major German public gender equality funding program ("Professorinnenprogramm") cannot be used for intersectional gender equality measures (ID 431), while another participant reports on a whole palette of corresponding measures that were implemented in the framework of exactly that program (ID 572). One participant seems to mix gender diversity with intersectional gender equality work when they state that it is a problem for intersectional gender equality work that the "legal mandate is clearly formulated in binary terms" (ID 233), another mixes it with diversity equality, when they state that it is a problem for intersectional gender equality work that according to the law they are only a women's representative (ID 158).

4.5 Summary Challenges and Problems of the Implementation of an Intersectional Gender Equality Strategy

The problems in the implementation of an intersectional approach in gender equality work can be summed up as a mismatch between requirements and available resources: the complexity of the concept challenges the routines and practices in gender equality work in a fundamental way. The political subject of its efforts must be re-conceptualized with significant consequences for the self-conception of the gender equality agents and their practical work. There are also new and more complex demands regarding data collection which so far are hard to fulfill for the organizations. Goals, strategies, measures, and addressed target groups must be revised. On the other hand, the personnel/time resources of gender equality agents to manage these tasks, train themselves and reflect on their role are often scarce and are already at their limits due to the demands of "classical" gender-only equality work. Resistances and organizational structures with distinctly separate responsibilities for different diversity categories and a sometimes-competitive atmosphere do not help either. Additionally, there is a lack of good practice examples, manuals or easily accessible training for how to practically implement an intersectional approach in gender equality work.

So, what can be done to improve the situation?

This will be answered in two ways:

First, we will present what we learnt from the survey about strategies to successfully implement intersectionality in gender equality work and make use of the relatively small number good practice examples that were submitted.

Secondly – based on the survey results and our own practical experience – we will make suggestions what could help to untie knots and solve mismatches that currently block progress in the implementation process.

5 Results: Strategies for Intersectionality used by Practitioners

Despite the low overall level of implementation of intersectional gender equality work, the survey submissions provided us with an exemplary set of intersectional gender equality measures from those organizations which are more advanced in the implementation process. The portrayed measures were solely chosen by determining if they can be categorized as intersectional gender equality measures (see 2.2 Terms). From the information contained in the survey results, we cannot judge their effectiveness, which is why we refrain to call them "good practices". In the following, we portray the chosen examples grouped by the underlying strategy that was used. The strategies have different prerequisites and levels of complexity.

5.1 Strategies for Identifying Needs of Intersectionally-discriminated Groups

Three different strategies can be found in the survey answers for gender equality actors to identify needs of intersectionally-discriminated groups:

Extending the gender monitoring to an intersectional analysis is the most advanced and demanding option for identifying needs but, at the same time, the most effective one as it can also be used to monitor the success of measures. Only one of the survey participants mentioned that this was planned in their organization – a university, which has been funded by a federal gender equality program (Professorinnenprogramm III) and has a position specifically dedicated to gender monitoring (ID 572). Nonetheless, 23% of the overall participants also collect some kind of data on gender in combination with at least one other category, not always, however, in such a structured way (see Fig. 2).

Exchanging with advocates of other discriminated groups has been identified as one of the first and basic steps towards an intersectional approach by several participants (IDs 158, 161, 560). Usually this is done by collaborating in working groups but learning about needs and reflecting about the situation of persons on the intersection of gender

and other categories can also be done informally with the advocates for the other categories. This can also help to get in touch with diverse target groups and lay a basis for further collaboration, for example in advertising intersectional measures.

Other alternative, low-threshold methods to collect data have only been mentioned once in the survey, though it seems fruitful to us to use alternative sources for data collection, with a low threshold and less requirements than the collection of statistical data or a fully realized gender monitoring process. One example is mentioned in the survey: here the needs of a certain intersectionally-discriminated target group were identified by documenting what affected persons shared about their problems in a mentoring program (ID 263).

5.2 Strategies for Intersectional Measure Design

Targeting intersectionally-discriminated groups specifically is certainly one of the clearest strategies, though not necessarily the most effective or the easiest to implement in every situation. Examples submitted by the survey participants were support for women with disabilities on their way to a professorship (PhD and Postdoc-contracts) (ID 419), support for female students with disabilities (in cooperation with the Inclusion Officer) (ID 455), a mentoring program for female students in STEM with a migration background (ID 548), coaching for women with a physical or mental impairment, from abroad or with care duties that make compatibility with their job difficult[73] (ID 575). Additionally, the gender equality agents that participated in the workshops of the MINTersectionality study acknowledged that when differences in needs are identified, specific programs for specific groups are necessary (Bitzan & Pöllman-Heller, 2015, p.31).

Integrating elements designed for an intersectionally-discriminated group in a general measure (for women in general or for another group in general) is an alternative option, which might need less resources and lead to good integration of the specific groups. However, it could also be more difficult to create a safe space for the intersectionally-discriminated group. One survey participant, for example, reported that their mentoring program for all female PhD students specifically targets female first-generation students and participants are invited to reflect on the effects of family educational background (ID 572). Obviously, it could also be done the other way around and a unit specifically for women could be integrated in a measure for first generation students.

---

[73] The last group of women has been targeted by reconciliation measures since the beginning of gender equality work. We counted the submission of measures in this field as intersectional if they were specifically targeted at women. Though not being especially innovative or new, we acknowledge that the combination of female gender and care duties has a completely different effect than the combination of male gender and care duties for the experience and possible discrimination of the person – which makes it an intersectional topic.

Favoring intersectionally-discriminated persons in selection processes for general measures is a way to specifically support intersectionally-discriminated groups, but without targeting their specific needs. One example for this strategy was submitted: a mentoring program for female, trans* and non-binary master students. In the selection procedure, first generation students, students with a migration background or with care responsibilities are favored (ID 572).

Promotion of measures specifically among intersectionally-discriminated groups can be done for measures with intersectional target groups as well as for general measures. To reflect on how to specifically reach intersectionally-discriminated groups when promoting a measure is valuable, it could be that you have to reconsider your methods and channels of promotion and think more from the point of diverse target groups – perhaps on the basis on learning more about their experience and where they get information from/which places they visit/what could be appealing to them, etc.. The promotion of a mentoring program for female PhD students is, for example, specifically targeted at first generation students (ID 572) or a measure for female students with a disability is also distributed on the mailing list of the Inclusion Officer (ID 455).

Designing measures and procedures in an inclusive way can promote the integration of an intersectionally-discriminated group and can be resource-efficient, but on the other hand might not be able to meet needs that are very specific to an intersectional target group or to create a dedicated safe space. In practice it means to design general measures in the most inclusive way possible regarding all aspects of its design, such as accessibility, diversity in methods, representation of diverse groups (for example among the trainers or contact points or in the promotion of the measure) and so on. This strategy is mentioned several times in the survey: One participant mentions that it is important that "as far as possible, all programs [are] bilingual, so that everyone understands them and feels that they are being addressed" (ID 71). Another reports that their family parties do not adhere to the Christian holidays (ID 95). Inclusive measure-design is also mentioned as a general strategy: "barrier-free and appealing also for minorities" (ID 71). More generally it is stated that "an intersectional perspective should be adopted in the design so as not to exclude anyone." (ID 572) It seems that this strategy is seen as a workaround solution or a substitute as the same participant explains in this context that this is especially important as in their organization "not all interventions can be executed intersectionally to target specific groups and/or reach a large enough target group" (ID 572). Another gender equality agent explains that an inclusive design of gender equality measures is applied as otherwise – due to a lack of data, the fear of stigmatization and small target groups – they feel "unable to act" (ID 419) and therefore portrays this strategy as not so demanding. Based on the statement of another participant – who describes this approach as a general strategy, not only for measure-design – we on the other hand see

this strategy as a very basic principal of intersectional gender equality work – not only a workaround. "Make processes, procedures and workflows equally accessible to all people" (ID 16) therefore seems to us a central motto. We agree that this approach is beneficial due to avoiding stigmatization while also being suitable for target groups that would otherwise be too small for specific measures. The assumption that data on the experiences of intersectionally-discriminated target groups is not needed for that strategy, however, seems to us as a misconception.

Conveying intersectional perspectives in gender/diversity awareness measures can be done without many prerequisites besides a trainer with intersectional expertise. A measure which uses this strategy, for example, is training of student tutors at a university: It "sensitizes the students regarding different diversity categories, their intersectional entanglements and how they can work in the university context. In their role as tutors, initial impulses are given for reflecting on privileges and disadvantages." (ID 572   ).

Targeting anti-discrimination measures at multi-discrimination is another potentially effective element of an intersectional gender equality work as it re-defines the target of anti-discrimination measures to specifically incorporate and address multi-discrimination. This is being done by one of the survey participants by sensitization of the anti-discrimination counselling unit and offering information on intersectional dynamics of discrimination on their website (ID 572). Another example is to sensitize the members of selection committees not only to unconscious bias regarding single categories of difference but also to their intersectional interaction (ID 572).

5.3 Consciously Sticking to One Category

One other strategy which we want to discuss in this context is to consciously stick to one category of difference as the target of a measure. One participant discusses this as a matter of "practicality [that] sometimes demands sticking to one category, such as gender, race or disability" (ID 140). Sadly, we do not have any further details on the reasons that led the participant to regard this solution as the only practical. But in general, we regard this as a natural part of an overall intersectional approach: if a measure is targeted at a group whose specific needs correspond to only one specific category of difference, it is of course legitimate to design it for this target group - while still being aware of the diversity among this target group, which would lead us back to, for example, strategy 5 "Designing measures and procedures in an inclusive way".

6 Suggestions for Further Professionalization

In this chapter we would like to present what we learnt about prerequisites for a further professionalization of intersectional gender equality work – which would enable a more consistent and successful implementation of the concept.

6.1 Sufficient Resources

One of the main results of the survey is a significant lack of resources to ensure a successful implementation of an intersectional approach due to its complexity and level of demand – especially but not exclusively in the process of first implementation.

6.1.1. Personnel resources

Sufficient personnel resources are the central key to a successful transformation towards intersectional gender equality work due to the level of demand regarding knowledge, awareness, self-reflection and re-conceptualization of monitoring, objectives, and measures. Many gender equality agents, however, work on a voluntary basis with little relief or personnel support. It must be made clear to the leaderships of research organizations that without sufficient personnel resources, a state of the art and effective gender equality strategy, which in our opinion requires an intersectional approach, is not feasible.

6.1.2. Theoretical and practical knowledge

Collecting and sharing, above all, practical knowledge on intersectional gender equality work is, additionally to theoretical knowledge, the most important element to enable gender equality agents to successfully implement the approach. A common effort must be made to remedy the lack of accessible expertise on concrete and practical implementation strategies by sharing good practice examples, creating manuals, offering talks and workshops and opportunities for exchange at networking events.

6.1.3. Advanced trainings on diversity competencies

Also helpful would be, in our opinion, for gender equality agents to improve their general diversity competencies, which enables them to be more sensitive to the needs of diverse and intersectionally-discriminated target groups, to get a better insight in their experience, and to better address them. Helpful could be, for example, to take part in intercultural training, to improve foreign language skills, and to read or hear about stories and experiences directly from affected persons.

6.2 Rethinking Allyship

In order to overcome the challenge of re-defining the political subject of gender equality work in an intersectional way it is necessary for the gender equality agents to rethink their self-conception and especially their concept of allyship: for many of the agents it is completely new to target not only the group of "women", which they themselves usually belong to and for whom they feel naturally comfortable advocating, but also groups which they are not part of themselves and that may feel more or less foreign to them. Following Schuster's diagnosis that expectations of "correct" intersectional action can result in a fear to act at all (Schuster 2016, pp.4-6), which we would also call a fear of one's own cultural imperialism, we would suggest reacting with a strengthened professionalization of gender equality work and the following strategies:

6.2.1 Reflecting own positioning and improve diversity awareness

Fearing one's own cultural imperialism, one's own racist, homophobic, ableist, lookist, and in other ways biased socialization is a first step and prerequisite for this step – but has to be used for a productive reflection of one's own positioning in society, one's own privileges, their consequences and how to use them in a way to be – in the best case – an effective ally. This process can be helped by diversity training and learning more about the experiences of persons affected by discrimination based on other categories than gender or by multi-discrimination.

6.2.2 Putting aside concerns about contact, collaboration and professional advocacy

Hesitation to get in contact and work together with advocates and groups of affected persons of other diversity categories should be overcome in favor of a new understanding of professional advocacy. As a gender equality agent, you have to be able to also advocate the needs of groups of intersectionally-discriminated groups that you do not belong to yourself.

6.2.3 Evidence-based practice

Evidence-based practice is important for the legitimation and success of this advocacy, thus being able to identify needs of groups not based on personal experience, personal belief or single reports but being able to base the gender equality strategy on specifically and methodically collected data. As this is reported to be very difficult in a quantitative way, qualitative data collection can fill the gap. Here anonymization can be handled in a different way also when dealing with small groups of people. Interviews and group discussions, but also the documentation of counselling requests or complaints can be considered. A similar advice is given by the European Commission (2022): "the perceived

lack of data should not be used as an impediment for action" (p.33) and "whilst small numbers can be an issue, […] qualitative analysis can enable the development of robust intersectional evidence" (p. 35).

6.2.4 Thinking and acting in alliances among equality agents

An important part of rethinking allyship in the aforementioned way can be to form and act in alliances with other equality agents, especially inside, but also outside of institutions, such as inclusion officers, anti-racism initiatives, queer alliances etc.. Going into competition with each other or letting yourselves be played off against each other might be what the scarce resources and questioned responsibilities automatically lead to. But in the end, we are all fighting the same battle and collaboration is more important than ever when implementing an intersectional approach, for the sake of self-reflection, for learning about the experience of diverse groups, for data collection, for the organization, the financing, and the promotion of measures and, last but not least, for demanding sufficient resources for equality work together.

7 Summary: Intersectionality as an Analytical Tool for Effective Gender Equality Strategy

"Intersectionality" is being used as a buzzword to signal a progressive gender equality strategy. It stands for something completely new, for a paradigmatic change. As there is little concrete experience of its implementation thus far, the concept remains open to interpretation and evokes fantasies. Additionally, it is often mixed up with other major developments in gender equality work: the extension of the target group to all genders and the confrontation with an upcoming diversity work in organizations. This whole development seems to induce confusion and a feeling of being overwhelmed – especially when not having the necessary resources at hand to meet the challenge. We have to take into account that intersectionality means a fundamental change of thinking about target groups, the political subject of one's work, the self-conception as a gender equality agent and advocate and/or ally, but at the same time we also want to de-mystify the approach and counteract its overwhelming aura: Reminding ourselves of EIGE's definition, intersectionality is basically an "Analytical tool for studying, understanding and responding to the ways in which sex and gender intersect with other personal characteristics/identities, and how these intersections contribute to unique experiences of discrimination" (EIGE 2023b and also European Commission 2022, p. 35). The purpose of an intersectional approach is consequently making gender equality strategies more effective, making visible those who need help the most and leaving no one behind.

As important and fundamental as this purpose is, in our opinion intersectionality remains an analytical tool to improve and re-tune, sometimes even revolutionize the existing gender equality strategy – but is not a completely new strategy in itself. In view of the insecurities and conflicts of requirements and resources that we have seen in the survey, this could be helpful to bear in mind. The approach needs a certain professional implementation, but in order to not get overwhelmed or risk not tackling the task at all, it can be practiced as a gradual and step by step change. We have shown, for example, that it is valuable not to abandon well-proven strategies and apply them also to an intersectional approach[74], that designing completely new measures is not the only successful strategy but also to re-design otherwise well-proven measures in an inclusive way or to implement elements targeted at intersectional target groups in general measures. It is also essential not to get thwarted by the fear of one's own cultural imperialism and instead use low threshold ways of data collection in order to create a first basis for an evidence-based approach and to make use of contact to other equality agents and the inherent synergies. In conclusion, our main result would be the need to remove the overwhelming aura of intersectionality and the inhibitions to act due to fear of contact with persons with different discriminatory experiences and a different position in society. We also have to improve the availability of resources in order to meet the requirements of the implementation. Therefore, it could be helpful to provide concrete manuals and good practice examples that make the concept tangible and offer concrete steps to de-mystify the concept while helping its professionalization. We hope our work can contribute to this goal. We are fully aware and want to stress that even the greatest efforts in this field will not be of much use without robust funding of gender and diversity equality work in German research organizations. Regarding further research a validation of our results in group discussions with gender equality practitioners as well as further data collection on how to gain the support of the organization's leadership for intersectional gender equality work - as the most important prerequisite for its success - would be valuable.

---

[74] like for example strategies to dramatize but also de-dramatize categories of difference to avoid stigmatization

References

AK ForschungsHandeln, ed., 2015. InterdepenDenken! Wie Positionierung und Intersektionalität forschend gestalten? Berlin: w_orten & meer.

Bitzan, R. and Pöllmann-Heller, K., 2015. MINTersectionality – Intersektionale Impulse für die Gender-Gleichstellungsarbeit an technisch orientierten Hochschulen. [online] Available at https://bukof.de/wp-content/uploads/jt15_MINTersectionality.pdf [Accessed 11 May 2023].

Brötzmann, N. and Pöllmann-Heller, K., 2020. Programme zur Unterstützung von Frauen in MINT-Fächern an Fachhochschulen – neue Ansätze durch intersektionale und fachkulturelle Perspektiven Erste Ergebnisse aus dem Teilvorhaben A „Intersektionale und fachkulturelle Perspektiven". [online] Available at https://sozial-gesundheitswissenschaften.oth-regensburg.de/fileadmin/Bereiche/Fakultaet_S/Bilder_Forschung/Mint_Strategien4.0/MINT-Strategien_4.0_OTH_Zwischenergebnisse.pdf [Accessed 17 May 2023].

Christoffersen, A., 2021. The politics of intersectional practice: Competing concepts of intersectionality. Policy and Politics. https://doi.org/10.1332/030557321X16194316141034

Crenshaw, K. W., 1989. Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics. University of Chicago Legal Forum, 139 (67), 149.

Debus, K., 2012. Dramatisierung, Entdramatisierung und Nicht-Dramatisierung in der geschlechterreflektierten Bildung. [online] Available at https://jus.dissens.de/fileadmin/JuS/Redaktion/Dokumente/Tagungsdokumentation/Dramatisierung__Entdramatisierung_und_Nicht-Dramatisierung_in_der_geschlechterreflektierenden_Bildung.pdf [Accessed 19 May 2023].

Do Mar Castro Varela, M. and Dhawan, N., ed., 2011. Soziale (Un)Gerechtigkeit. Kritische Perspektiven auf Diversity, Intersektionalität und Antidiskriminierung. Berlin: LIT Verlag.

EIGE, 2023a. Gender Equality in Academia and Research. [online] Available at https://eige.europa.eu/gender-mainstreaming/toolkits/gear/step-step-guide/step-2n [Accessed 16 May 2023].

EIGE, 2023b. Intersectionality. Description. [online] Available at https://eige.europa.eu/thesaurus/terms/1263

EIGE, 2023c. Gender Equality in Academia and Research – GEAR tool. What is a Gender Equality Plan. [online] Available at https://eige.europa.eu/gender-mainstreaming/toolkits/gear/what-gender-equality-plan-gep

European Commission, 2020a. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. A new ERA for Research and Innovation. [online] Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2020%3A628%3AFIN

European Commission, 2022. Approaches to inclusive gender equality in research and innovation (R&). [online] Available at https://op.europa.eu/o/opportal-service/download-handler?identifier=006a43e7-3eda-11ed-92ed-01aa75ed71a1&format=pdf&language=en&productionSystem=cellar&part=

European Commission, 2023. The Commission's gender equality strategy. [online] Available at https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/democracy-and-rights/gender-equality-research-and-innovation_en

Kaufmann, M. E., 2019. In Darowska: Diversity an der Universität. Diskriminierungskritische und intersektionale Perspektiven auf Chancengleichheit an der Hochschule.

Kaufmann, M. E., 2019. Intersectionality Matters!. Zur Bedeutung der Intersectional Critical Diversity Studies für die Hochschulpraxis. In: L. Darowska, ed. Diversity an der Universität. Bielefeld: transcript Verlag, 53-84.

Kurz, E., 2022. Intersektionalität in feministischer Praxis. Differenzkonzepte und ihre Umsetzung in feministischen Gruppen. Bielefeld: transcript.

Mayring, P. and Fenzl, T., 2011. Qualitative Inhaltsanalyse. Heidelberg: Springer-Verlag.

Smykalla, S. and Vinz, D., ed., 2011. Intersektionalität zwischen Gender und Diversity. Theorien, Methoden und Politiken der Chancengleichheit. Münster: Verlag Westfälisches Dampfboot.

Care or Self-Care - Minority Women in Cycling

M. Reljan-Delaney[1], J. Wood[1] and A. Taylor[2]

[1]giCentre, City, University of London, United Kingdom

[2] HCID, City, University of London, United Kingdom

Abstract. The gender, racial, and socioeconomic inequalities in active travel are well documented (Lam, 2022). Recent macro-studies (Goel, Goodman, et al., 2022; Goel, Oyebode, et al., 2022a) on gender and active travel show the widespread gender inequality and highlight the existing disparity in the cycling uptake by women in countries with a low cycling modal share, like London. While studies exploring aspects of cycling have seen a marked increase in the last two decades (Pucher and Buehler, 2017) there is a conspicuous lack of literature on sub-groups such as ethnic minority cyclists and especially ethnic minority women. This work seeks to illuminate mobility and the role of visualization in uncovering hidden powers and unseen realities of female ethnic minorities and answer the question: "Can visualizing and digitizing the cycling movement, combined with qualitative methods help us uncover the cycling context of ethnic minorities women that use bicycles and gain new insights into context of and their relationship with cycling?". It is doing that by developing a visual presentation method tailored to enable maximum exploration of the individual, recorded journeys. The aim of the paper is to present the method and to demonstrate its ability to extract new insights. The importance of the work lies in the fact that we need a better understanding of realities of female mobility in order to inform future work on urban development and the promotion of cycling. By focusing on the specific sub-group, Muslim and BAME (Black, Asian, and Minority Ethnic) women cyclists, this work aims to get away from dominant voices and representations and reach the invisible and overlooked. To achieve this, I worked with a small group of ethnic minority women, who kept a diary of their cycling experience and used a GPS tracker for logging their cycling over a period of two weeks. The data they collected was presented back to them as an interactive individual data notebook that contained visual modelling of their journeys and the diary prompts.

This combination of technology, visualization, and a qualitative approach has revealed that contrary to expectations, the way women move in their environment has been misunderstood as it primarily serves as a means of self-care and not care for others.

This empirical work presents a new framing for considering the way female cyclists use their environment and what this environment needs to offer. It is giving a voice to the growing and vibrant cycling undercurrent of ethnic minority women in active travel as well as engaging the citizens-action groups that are supporting mobility (r)evolution.

1 Introduction

The growing recognition of the advantages associated with active travel (Oja *et al.*, 2011; Panis, 2011; Handy, van Wee and Kroesen, 2014) has sparked a surge in interest in cycling and other forms of active transportation. This resurgence has led to a substantial and diverse body of research. The number of scholarly publications on cycling has increased by thirteen times between 1995 and 2016 (Pucher and Buehler, 2017), covering a wide range of topics and perspectives. These encompass studies on infrastructure development (Alta, 2017; Moran *et al.*, 2018), diversity in cycling (Aldred and Dales, 2017), and the portrayal of cycling in the media (Caimotto, 2020), among others.

Londoner's travel habits have been changed by the COVID-19 pandemic, which has also impacted attitudes towards cycling (Department for Transport, 2021). There has been an increase in cycling, particularly among minority communities in terms of gender and ethnicity. While the primary reason for this increased uptake is attributed to reduced traffic levels (Hong, McArthur and Raturi, 2020a; Nikitas *et al.*, 2021), it is evident that the pandemic has had a broader impact, influencing various aspects of life, including family dynamics (Nicola, Ruspini and Nicola, 2020), work conventions and the inclination to explore new behaviours and practices (Figus, 2020). Still, the numbers are small as cycling accounts for only 27% of the trips made in the capital and out of that 27%, only 17% is made by ethnic minorities. There are no numbers on how many of those are female but we do know that over 75% overall are male. The numbers on ethnicity are especially surprising if we take into account that the recent population census has found that London is the most diverse place in the UK with 47% of its population identifying as an ethnic minority. All of this indicates that there is a misalignment between the potential and uptake when it comes to cycling. It also indicates that current measures for promoting and encouraging cycling are not meeting their target.

Given the aforementioned changes and the multitude of factors influencing them, conducting research on cycling practices and individuals' role in the active travel landscape is crucial to sustain and capitalize on the momentum gained during the COVID-19 period. However, it is essential that this research goes beyond the confines of the pandemic and employs methodologies that allow for the identification of meaningful indicators and trends in everyone's cycling experiences, which can be adapted and applied flexibly. This project asks, if visualizing and digitizing the cycling movement, combined with qualitative methods can help us uncover the cycling context of ethnic minority women who use bicycles and gain new insights into the context of and their relationship with cycling. We propose the methodology for capturing and presenting movement that surrogates the cycling experience and maintains a link to quantitative data during qualitative interviews, thus situating the riding experience and giving us new insights into the realities of the subject's movements and the motivations for their choices.

Exploration of Diversity in Cycling

Even before the pandemic, government bodies had already begun acknowledging the importance of active travel and implementing measures to reduce reliance on cars and fossil fuel-powered vehicles. The literature consistently highlights good infrastructure and safety as key factors influencing the likelihood of cycling uptake (Pucher, 2001; Jacobsen, 2003). However, despite publicized investments in infrastructure, Transport for London's (TfL) report (Transport for London, 2018) indicates that there was no significant increase in the number of new cyclists prior to the COVID-19 pandemic. The report reveals that the overall distance travelled by bicycle has indeed increased, but this can mainly be attributed to existing cyclists embarking on longer journeys. Additionally, research by Aldred and Dales (Aldred and Dales, 2017) suggests that improving infrastructure does not have a substantial impact on diversifying the demographic composition of the cycling population, which continues to be predominantly young males. The comparison of cycling census data from 2001 and 2011, along with corresponding infrastructure developments, reinforces the finding that women are among the groups whose cycling rates do not significantly increase in response to improved infrastructure. This observation is supported by Lam's examination of cycling advocacy and policy-making in Hackney, a London borough known for its high cycling levels (Lam, 2018), as well as Steinbach *et al.*'s (Steinbach *et al.*, 2011) study on the correlation between ethnicity, class, gender, and cycling propensity among London cyclists. Despite countries with well-developed cycling infrastructure demonstrating greater diversity and gender balance in cycling (Goel, Goodman, *et al.*, 2022), the incremental improvement in infrastructure provision in London appears to be less effective in promoting diversification. Consequently, additional factors are required to complement infrastructure development

efforts in order to achieve a more diverse cycling population. Lam (Lam, 2018) challenges the decision-making process of allocation and placing the cycling infrastructure in a radial model, which prioritizes one type of journey (an economic commute) overlooking the population's diversity of needs and functions. Lam asserts that diversity is revealed when quantitative information is contextualised, which can be achieved by complementing it with qualitative methods. This thinking is echoed by Krizek (Krizek, 2018) who takes the position that determining the cycling benefit necessitates uncovering the distinctive elements within the cycling journey and going beyond the functional characteristics.

Some methodological advances have been made, for example, the work of *Gamble et al.* (Gamble, Snizek and Nielsen, 2017) which augments the quantitative data with photographic evidence and diary. While this is a move towards situating the data, the approach requires the time, persistence, and dedication found in advocacy. Thus, it does not address the issues of lack of intersectionality, gender equality, and ethnic representation in cycling research that Lam has raised (Lam, 2018).

Cycling and Visualisation

Cycling and visualization have a long-standing and interconnected relationship that encompasses various aspects. This association extends from the utilization of visualization techniques integrated into fitness devices, as discussed by Niess *et al.* (Niess *et al.*, 2020), to the more comprehensive exploration of movement patterns through visual analysis, as examined by Beecham, Wood and Bowerman (2014).

In the realm of fitness devices, visualization plays a crucial role in enhancing the cycling experience, as highlighted by Niess *et al.* (2020). The visualizations on the devices provide cyclists with real-time feedback on their performance metrics, such as speed, distance covered, and heart rate. Thus, users can monitor their progress, set goals, and adjust their training accordingly. This integration of visualization within fitness devices creates a symbiotic relationship between cyclists and their data, some would argue, facilitating a more informed and optimized exercise experience.

Beecham and Wood perform a visual analysis of urban movement patterns (Beecham, Wood and Bowerman, 2014) and use origin-destination data of city rental bicycle schemes. They combine it with other available data to gain insights into the movement, effects of the urban landscape, economic positions of users, and differences in gendered approaches as well as creating animations that explore the evolution of the hire cycling journeys, providing information on the frequency, directionality, and seasonality of cycling locations (Beecham and Wood, 2014).

Cycling and Geography

Geography is the study of the environment we inhabit. It recognizes the distinction between space, which is measurable, and place which reflects human interaction and the experience (Agnew, 2011). Works in urban geography position cities in relation to sustainability (Spinney, 2020a), health (Waitt and Buchanan, 2023), uptake of cycling, and active travel (Aldred, Croft and Goodman, 2018) among others.

But the story of geography is often a story of borders and cycling takes us across borders. It traverses, intersects, touches, and glides through familiar as well as new spaces and locations. In sprawling urban settings like London, cycling routes can vary, with cyclists sometimes opting for the shortest path, other times choosing the least hilly route, and occasionally sticking to designated cycling paths. Thus in complex urban environments, such as London, people who cycle, and their experiences are difficult to capture and measure, and what we often get is fractured and incomplete. We used maps as a substitute for actual journeys, enabling exploration with fewer spatial limitations and boundaries. However, it's important to recognize that maps themselves encode and possess their own expression and representation of the world they depict. They shape and influence the experiences of individuals who interact with them, presenting both possibilities and constraints.

Women and Cycling

In the research literature, female cyclists tend to be associated with journeys of care (Ravensbergen, Buliung and Sersli, 2020; Spinney, 2020; Goel, Oyebode, *et al.*, 2022). Journeys of care are outings that are made in order to take care of dependants, such as children or elderly, and for purposes of domesticity. They differ from commuting cycling in that they are local and more fragmented as they often contain a number of stops. This practice is called trip-chaining (Ravensbergen, Buliung and Laliberté, 2019). London's radial cycling infrastructure, which supports commuting, does not allow for this type of journey (Criado-Perez, 2019; Spinney, 2020; Lam, 2022). There is some evidence that journeys of care, and their challenges are one of the causes of low female cycling uptake (Criado-Perez, 2019; Ravensbergen, Buliung and Laliberté, 2019).

In her work, Criado-Perez (Criado-Perez, 2019) has discussed the prevalence of gender bias in research and in practice. Her work looks at who has a voice and who is enabled. If, in that context, we consider that only 27% of cyclists in London are women, this poses a question of recognition and equality. Who has a voice and who is enabled? If intersectionality explores how our identities influence our capabilities, in the context of cycling, it appears that being a woman predisposes you not to participate in cycling.

Our understanding and familiarity with attitudes and manner of cycling when it comes to what is considered minority populations is even more limited. The number of research studies is small and often relies on a mixture of literature review, examination of policy documents, and opinions extracted from interviews (Lam, 2018), surveys (Spinney, 2020), or counting (Emond, Tang and Handy, 2009) (Hong, McArthur and Raturi, 2020). Some works strive to adopt a more holistic approach and marry disparate data sets from a variety of sources. Goel *et al.* (Goel, Goodman, *et al.*, 2022) look at 19 cities and their active travel data in order to compare and extract insights. Their findings are that women's mobility is shaped by their care responsibilities and social norms. Women are, overall, 5% more active than men and complete more journeys by active travel methods. Despite this, they cycle less than men, except in high-cycling environments, where men and women cycle equally.

In their work, Song, Kirch and Taylor's (Song, Kirschen and Taylor, 2019) interviewed participants in Solo, Indonesia to identify barriers for women such as access to bicycles and the appropriate infrastructure, as well as feelings of vulnerability while on the bicycle. In conclusion, there is a lack of comprehensive research that adequately represents and recognizes ethnic minority cyclists despite acknowledgment that ethnicity and cultural practices play a role in the way people choose to interact with their environment. We haven't got a reliable method to extract such knowledge and little insight into the subgroup's habits and attitudes. This project suggests one method that encompasses data collection, presentation, and analysis.

2 Methods

To address points raised in the previous chapter, we approach a volunteer organization supporting female cycling and whose membership largely consists of ethnic minority women. We recruited cross-sectionally wanting to capture a range of cycling competencies. Data gathering lasted two weeks, during which the participants were asked to use a GPS tracker in order to log their cycling journeys and fill in a twice-daily short survey diary. The GPS gave us a snapshot of all cycling activities without unintentional bias which is often present in surveys and interviews (Heckman, 2013). Thus gathered data was then transformed into the data notebook containing an interactive representation of the journeys made during the data collection period. The notebook, and the visualizations it contained, were used as elicitation prompts and were the basis for the individual interview which was then analysed using thematic analysis (Braun and Clarke, 2013).

2.1 Recruitment

We have established that in London women, and especially ethnic minority women are an unrepresented among the cyclists. In the best of circumstances, finding dedicated participants is a challenge, compounded in this case by the small size and dispersion of this subgroup.

One of the ways to mitigate this dearth is to engage with organizations working with relevant communities. In London, there are specific cycling groups working with women, especially women from minority backgrounds that offer support and focus. We engaged with one of the mentioned female cycling groups (FCG) and took part in their activities, which enabled us to conduct targeted cross-sectional sampling (Faugier and Sargeant, 1997). In order to protect the confidentiality and anonymity of the organization, as well as the individuals involved, the names, and certain minor details pertaining to the participants have been altered.

The project had a three-month data-gathering timeline and budget for two devices, which limited us to seven participants. The participants were of varying cycling skill levels, where four could be classified as intermediate cyclists, two as experienced, and one as beginner (Fig. 1).

Cycling proficiency	Number of participants
Intermediate	4
Experienced/advocate	2
Beginner	1

Figure 1: Participants had varied cycling proficiency. 60% of participants were intermediate cyclists, with 30% advanced and 10% at the beginner skill level.

2.2 Data Collection

Due to concerns over privacy and GDPR (General Data Protection Regulation which ensures rights and the privacy of individuals are protected) data compliance (Gu *et al.*, 2017; Bishop *et al.*, 2020; Hassandoust, Akhlaghpour and Johnston, 2021) we decided not to utilize commercial mobile applications with tracking capabilities such as Strava or Kamoot. While some studies develop custom applications, which gives them greater control over what and how data is collected (Tamura *et al.*, 2019; Boakye *et al.*, 2021), this requires a large time investment that we did not have at our disposal. For those reasons, we opted for passive collection using a cycling personal computer Elemnt Bolt tracker. The metrics we were interested in collecting were time, longitude, and latitude.

We used the GPS Visualiser (Schneider, 2019), an online data management tool to smooth the data, convert it into the desired format (from .fit to .gpx), and extrapolate the speed. The smoothing was achieved using the Kalman smoothing algorithm due to the method's stability and its ability to faithfully capture the desired data systems (Zhou *et al.*, 2019; Boakye *et al.*, 2021).

2.2.1 Survey-diary

A diary keeping is a popular data collection method for gathering insight into individuals' habits and thinking (Gunthert and Wenze, 2012). When it comes to mobility studies, diaries tend to accompany movement data collection (Handy, van Wee and Kroesen, 2014; Neves and Brand, 2019). We used diaries as a memory jogger and to contextualize the GPS data.

The surveys were sent in the morning and in the evening (at the pre-agreed time). The morning diary asked about participants' cycling plans and the evening survey asked for a report of the actual cycling done. The reasoning was that this would capture the days when participants encountered barriers to cycling (unrealized plans), as well as spontaneous and opportunistic journeys. In anticipation of trip-chaining (Ravensbergen, Buliung and Sersli, 2020), participants were asked about the number of stops they were planning/made. Other questions were the category of the journey, whether they cycled in company, and a memory jogger comment/word.

2.3 Data Notebook

Data notebooks are computing environments that integrate interaction and easy access to data. They are flexible in that they usually facilitate the use of different coding languages, as well as the import of libraries. One of their major advantages is the ability to include plain text passages with the code outputs, which enables better communication between users of the notebook and its creators (Wood, Kachkaev and Dykes, 2019).
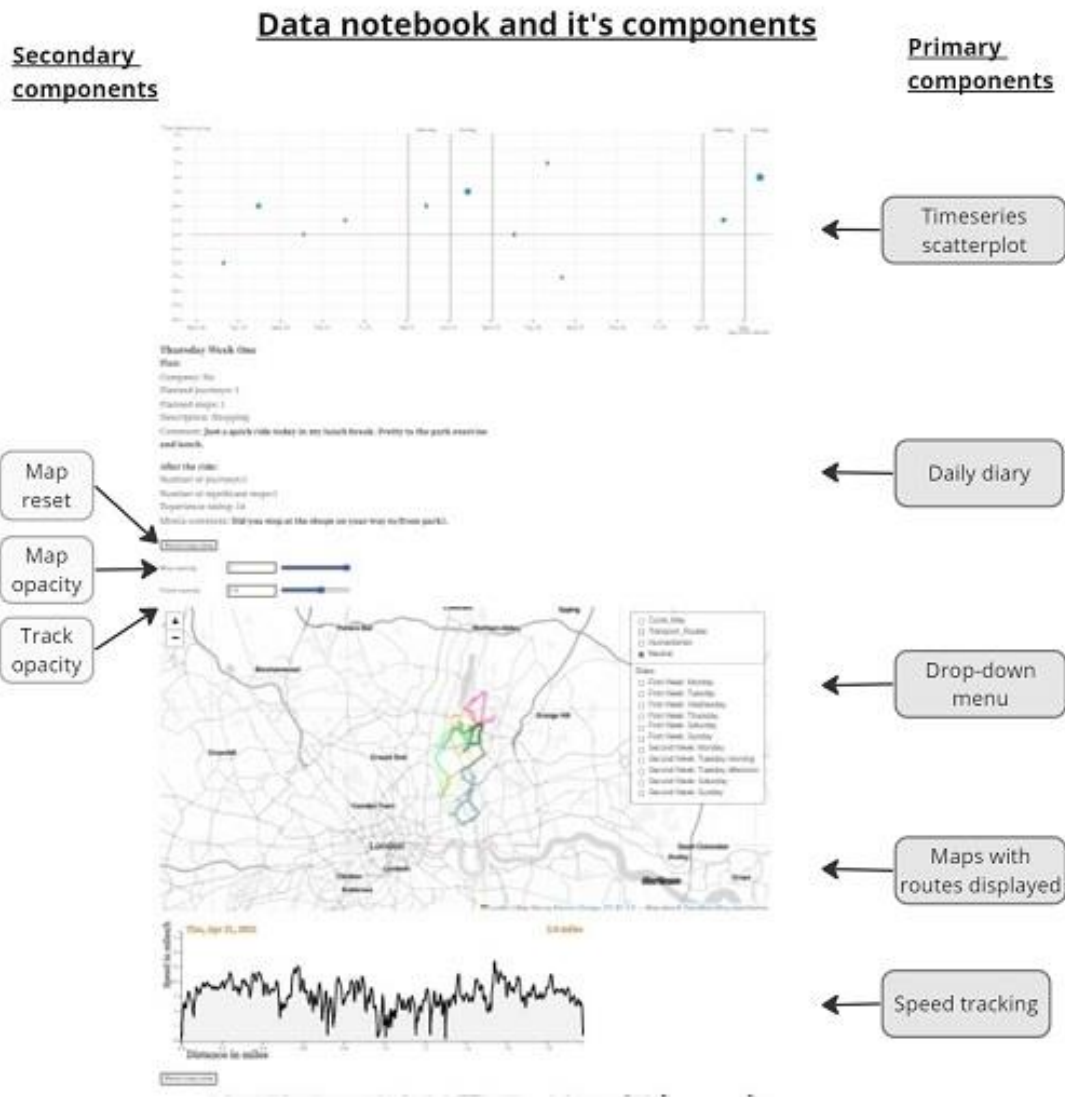
Figure 2: Data notebook with the primary and secondary components.

We have chosen <u>Observable</u> (Bostock, 2017) for this project as it has facilitated the development of an interconnected system of interdependent and branching pages. This ecosystem has allowed for efficient data manipulation and customization of data presentation, while also providing control over processes within a reactive environment. The use of Observable has provided a versatile and dynamic framework for achieving the project's goals. It enabled us to incorporate the daily survey diary and create a design that would foster recollection and enable exploration.

2.4 Design and Map Choices

The notebook design contained primary and secondary components (Fig 2). The primary components were the time-series scatterplot which presented temporal placement and the duration of the rides; the display of the survey-diary entries; map space with the display of the routes; the drop-down menu that enabled participants to view rides in isolation and manage the base map display; and the speed tracking scatterplot. The secondary components had a supporting function and they were map reset as well as map and track opacity buttons.

As our previous work has shown that base maps play a role in recollection and association, the participants were enabled to change between four representations, each with their own embeddings.

Figure 3a: Example of Humanitarian map

Figure 3b: Example of Stamen Light map

Figure 3c: Example of Transport OSM map

Figure 3d: Example of Cycle OSM map

Figure 3: Examples of the four types of a map used in the data notebook.
All the examples use the same geographical area.

2.4.1 The Maps

The selection of maps in the data notebook has been intentionally limited to avoid overwhelming the participants and to ensure clarity in the analysis process. The chosen maps have been carefully selected based on the specific information they convey and their visual characteristics. This approach allows for focused and effective analysis while providing participants with clear and meaningful visual representations of the data.

When creating the maps, three categories of attributes were considered.

1. **Information that it relates** - all the maps differ in what they capture as well as the spatial layout of the area. This is in increasing complexity from the Stamen Light map (this map will also be referred to as 'neutral' in the following text) to the OSM Cycle map. Each map offers a different environment.

2. **Visual Clutter** - Visual clutter is an agglomeration of features in an image and its calculation can be achieved in a variety of ways (as a number of distinct objects, number of contrasting hues, number of vertices in an image etc.). Due to its effect on the participant's ability to segment the visual presentation, it has an impact on interpretation and engagement (Rosenholtz, Li and Nakano, 2007). However, visual clutter is subjective and difficult to define in tasks with interactive and dynamic geographical representations.

Based on these considerations, we chose the following four maps:

Stamen Toner maps are black-and-white maps, which are ideal for overlaying data and visualizations. We chose Stamen Toner Light as it is neutral, unobtrusive, and devoid of extra features that could influence the participant's narrative (Fig 3a).

OSM transport map is specifically designed to showcase transportation features and information derived from OSM data. Its primary purpose is to highlight details pertaining to transportation infrastructure, including roads, highways, railways, and various public transportation systems such as buses and subways. Anecdotal evidence shows that novice cyclists often follow bus routes and use other public transport features for orientation (Fig 3c).

Humanitarian map aids disaster response and humanitarian efforts. It identifies infrastructure, resources, and transportation routes. Volunteers worldwide update it in real time using satellite imagery. It improves effectiveness and efficiency in relief efforts. The map's features are designed for offline use in areas without electricity and to be a base map for rescue and relief efforts. It has a muted color scheme and local details which are considered important for orientation (Fig. 3a)

OSM Cycle Map This map clearly marks cycle lanes, cycle parking, A-roads, and high roads. It includes cycle-specific icons like bike repair, water stations, cycle furniture, and rain shelters. However, it has the highest visual clutter (Rosenholtz, Li and Nakano, 2007), strong hues, and large contrasts. Clutter in this context refers to the visual appearance and number of features competing for attention, not the choice of content or its usefulness.

2.4.2 The visualization of cycling frequency and cycling trends

A time series scatter plot was created to visualize the time and duration of all recorded rides during the two-week period. The purpose of this plot was to help participants identify trends and assist in remembering their cycling activities.

The data used for the time series scatter plot consisted of recorded ride dates and times. The dates were in UTC format and were used to extract attributes such as duration, time of day, and day of the week.

In the resulting scatter plot (Fig, 5) the position encoded the date and time, while the magnitude of the circles represented the length of the recordings. The time series scatter plot provided a visually informative representation of the recorded rides, incorporating design principles of 'maximum information per ink ratio that promotes comparison and relationships' (Munzner, 2014) to enhance clarity and understanding.
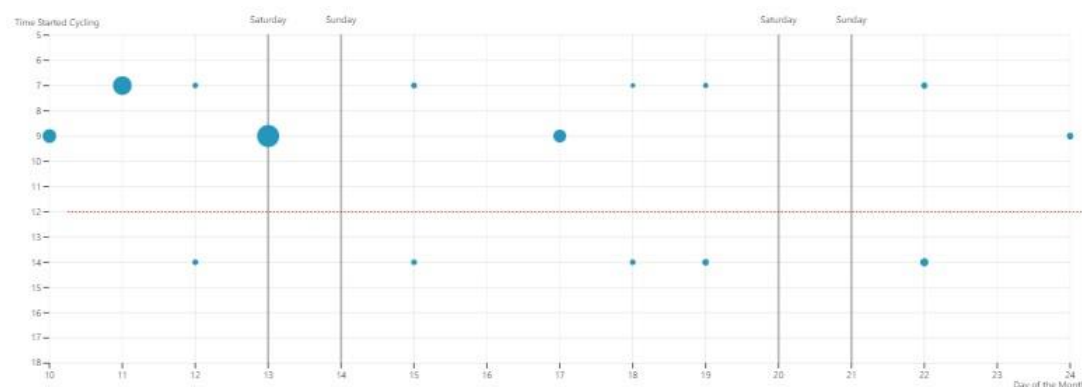
Figure 4: The scatter plot of cycling activity per day, with the duration with the dates on the x-axis and the time of day on the y-axis.

The distance between the design elements matters and the research has shown that the excessive need for scrolling leads to disengagement (Fessenden, 2018). Hence, two versions of the maps was develop and placed in positions that would make them accessible and aid interpretation during the interaction with the maps.
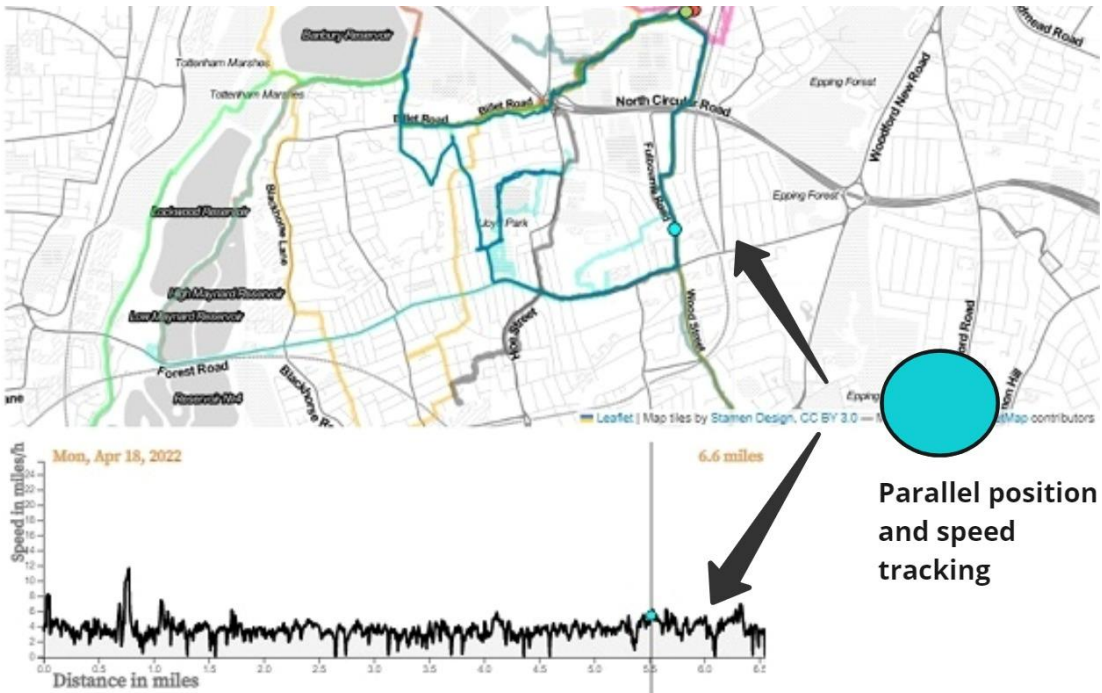
2.4.3 Speed Tracking

The measurement of cycling speed is often used for performance tracking and comparison (Craig and Norton, 2001; Douglas, 2021), while the analysis of the number of stops made by cyclists helps contextualize their interactions with other road users (Börjesson *et al.*, 2018). In a study by Parajito *et al.*, speed and geo-location data were combined to identify friction locations and their characteristics in three European cities (Pajarito and Gould, 2018).

In the context of this study involving women participants, identifying stops can provide insights into trip-chaining behavior associated with female mobility (Schneider, Daamen and Hoogendoorn, 2022). To facilitate the recognition and identification of stops, participants were instructed to record significant stops in their daily diaries. Additionally, their speed data was plotted on a line chart positioned below the map. An interactive feature was implemented to enable cross-filtering (Psallidas and Wu, 2018; Schneider, Daamen and Hoogendoorn, 2022), where selecting a point on the speed line chart would highlight the corresponding location on the route map.

The top map includes two additional markers: a green circle representing the start of the recording and a red circle indicating the endpoint (Fig 5).

Figure 5: Data notebook detail - speed tracking. The map displayed the route taken and the line chart displayed the speed. The participants were able to relate position with the speed by moving the mouse along the line chart. This displayed as a blue circle and moved a corresponding circle on the map. The blue circle above the text in this image is a magnified version of the circles used and it is present in this image only for illustration purposes.

2.3.5 Layers control

The data notebook incorporates map sections with multiple tile layers and GPS data to provide a visual representation of geographic information (Jordan and Henderson, 1995). GPS routes captured from participants' recorded cycle rides are displayed on the map, showing location and movement, along with additional metadata such as timestamps, speed, and direction.

Users have manual control over the maps and GPS routes, allowing them to zoom in and out, pan around, and toggle between different layers (Nguyen, Colman and Han, 2013). The representation includes interactive features such as dropdown menus and checkboxes. Dropdown menus enable users to select base maps, while checkboxes allow for the selection and display of individual or multiple rides (Fig. 6a) (Psallidas and Wu, 2018). Automated reset buttons are available to re-centre the maps, and sliders control the opacity of non-highlighted journeys and facilitate data exploration (Nguyen, Colman and Han, 2013).

The integration of GPS routes and map layers in the data notebook provides a comprehensive and interactive visualization tool for analysing and exploring participants' recorded rides (Jordan and Henderson, 1995; Psallidas and Wu, 2018).
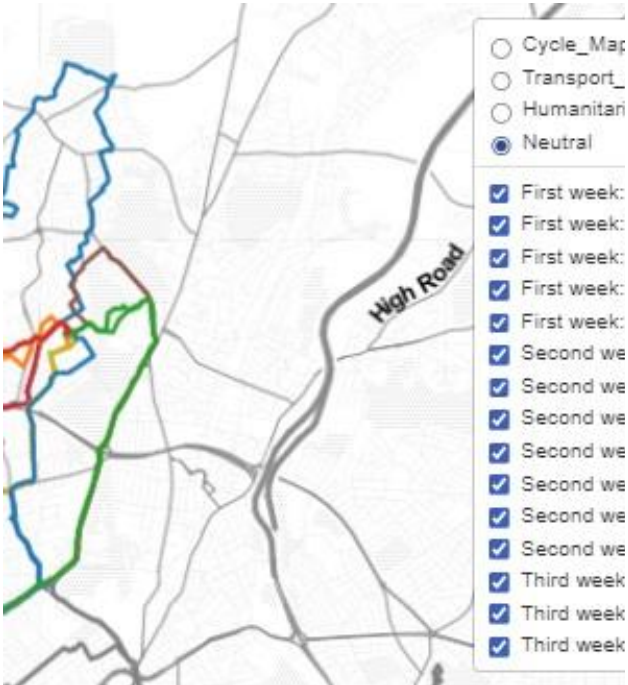
Figure 6a: A drop menu that enables multiple journey selection.
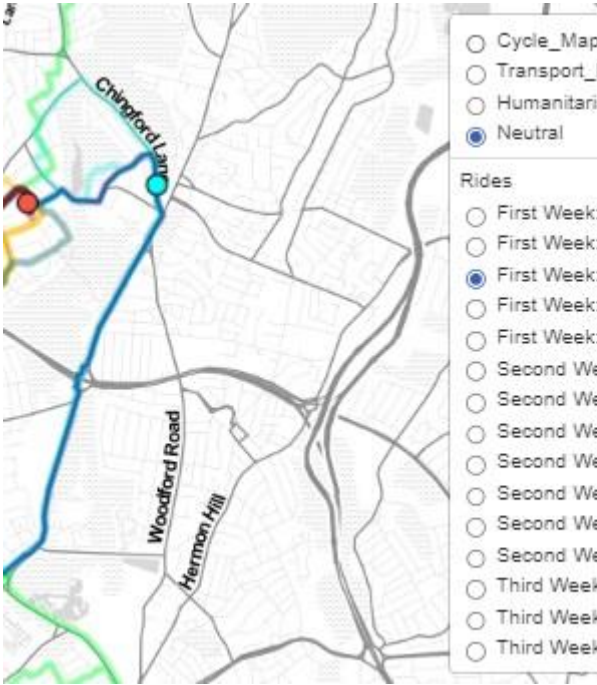
Figure 6b: drop menu for a single journey selection.

Figure 6: Participants had a choice of base maps as well whether to view a single journey or several journeys simultaneously.

3 Analysis

The analysis was performed on the content of the interviews and the actions and interactions with the data notebook.

The interviews were transcribed and examined in the combination with the screen capture recordings. We performed thematic analysis (Braun and Clarke, 2013) supported by NVivo software.

The next section presents two illustrative examples, followed by an analysis of the overall cohort's outcomes.

3.1 Two Case Studies of Participant Interaction: Ethnographic Analysis and Individual Outcomes

Participants in this study had varied riding experiences and we are presenting two case studies of; one at each side of the spectrum; a cycling advocate and a novice.

3.1.1 The Case of a Cycling Advocate: Amira

"If I would have to change the job and it was closer to home, I would leave half an hour early to give myself time to cycle"

Amira is an avid cyclist, and cycling is an important part of her life. She is the head of a large family and a working mother. She also volunteers with a female Muslim cycling group and is a trained ride leader. During the two weeks of data collection, she recorded 15 journeys, out of which 10 were commuting, 3 were leading organised rides and two were leisure. Thus classifying her mobility would put Amira in the class of utility cyclists. However, this would be a gross misinterpretation. When on the bicycle, this is her time for reflection and independence from daily tasks (motherhood, employment). She stated: "Once I am on the bike, I can turn this way, or that way without telling anyone." In Fig 6 we can see the ecosystem of the routes she takes to and from a regular destination (the exact location has been obscured to preserve privacy). Upon examination, we can see that there are five variations on the route, one of which incorporates a loop through a park. Asked to explain this behaviour, she explained that the route depends on the level of energy and need for contemplation on the day. There is no practical reason for the deviation, such as a visit to a shop on the way or a roadblock and this behaviour would not have been exposed in an interview or a survey.
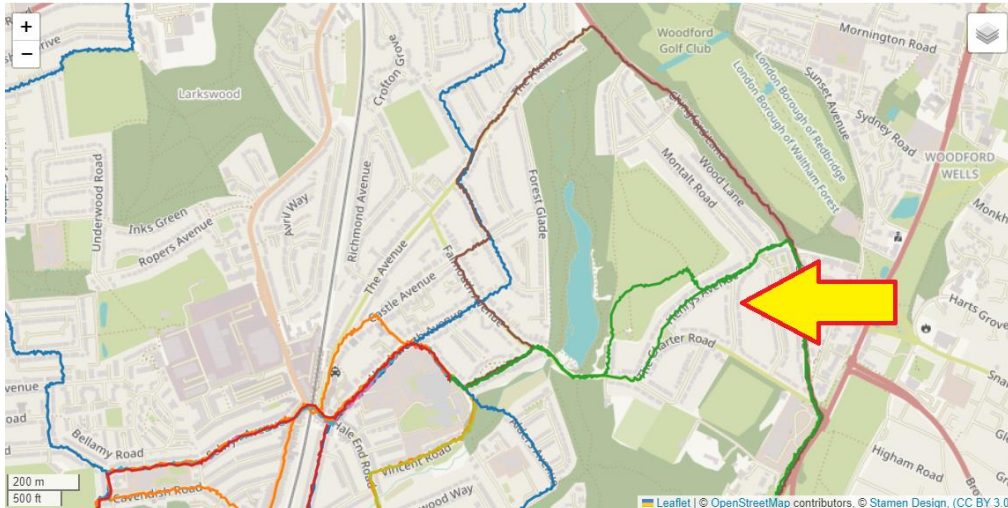
Figure 7: Different routes Amira takes to and from same destination. Yellow arrow is highlighting an instance of incorporating a park visit on the way to work.

She also has an interesting attitude towards cycling infrastructure. For her, long, straight segregated stretches are more tiring than the diverse experiences of dealing with traffic, or using side streets, as she finds safe monotony mentally dulling.

Despite having children, she cycles with them very rarely and does not use the bike for utility tasks or care journeys. Nor does she do any trip-chaining. It is primarily her time for reflection and independence from daily tasks (motherhood, employment).

3.1.2 The Novice Cyclists: Thea

"I always cycle in the company."
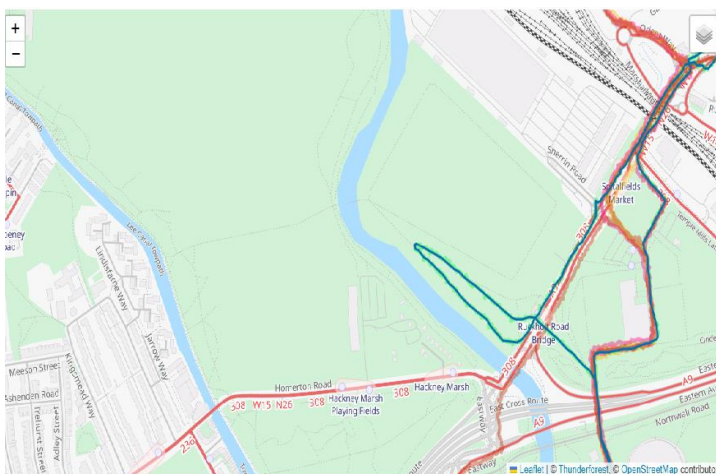
Figure 8: An example of Thea exploring her environment.

Thea is a novice cyclist. She is a single woman in her late forties who learned to ride through a local authority scheme and has built her confidence by taking part in Women Cycling Group's beginner rides. She is at the beginning of her cycling journey and while very enthusiastic, aware of her lack of skill. For that reason, she tends to always cycle in company of others. She recorded rides on five days, with all the rides lasting over two hours. The first interesting pattern visible in her notebook is that all her rides are very early in the morning and mostly on the weekends. Also, there is very little overlap in the routes. The reason for this became evident when she started describing her recorded movements. While one might expect an inexperienced rider to stick to familiar and signposted routes that is not the case with Thea and her friends. Thea uses the cover of early weekends to explore her environment and expose herself to cycling on a variety of provisions in a gradual way. She is fiercely experimental and determined to carve out a place for herself. This has only been made possible by her involvement in the cycling advocacy group as they gave her the initial introduction to the area and this is where she met her cycling friends. Fig 7 shows one of the anomalies in Thea's cycling that is a result of the trial-and-error approach she has adopted in the absence of cyclist-friendly signage in her area. Thea also does not use a bicycle for utility, commuting, or care and does not do trip-chaining when out.

3.2 Analysis of the Cohort's Interaction with the Data Notebook

Due to COVID-19 disruption, sessions meetings took place in public venues and using the researchers' device. Hence, the interviews were performed using a chauffeured interaction method (Wood, Beecham and Dykes, 2014) where participants instructed with prompts and the researchers executed them.

3.3 Observations on Session Interaction

Participants had different levels of activity during the recording period and different levels of engagement with the sessions. The length of the sessions ranged from 25 to 80 min, while the number of journeys ranged between seven and seventeen. In Fig 10 we can see that the high number of recorded journeys does not indicate longer interviews. The two participants who were new to cycling spent the longest discussing their outings, while the participant with the most recorded journeys spent only 3 minutes per route. However, there were some commonalities. The two participants whose interviews were the shortest both performed short, repetitive journeys with little variation.

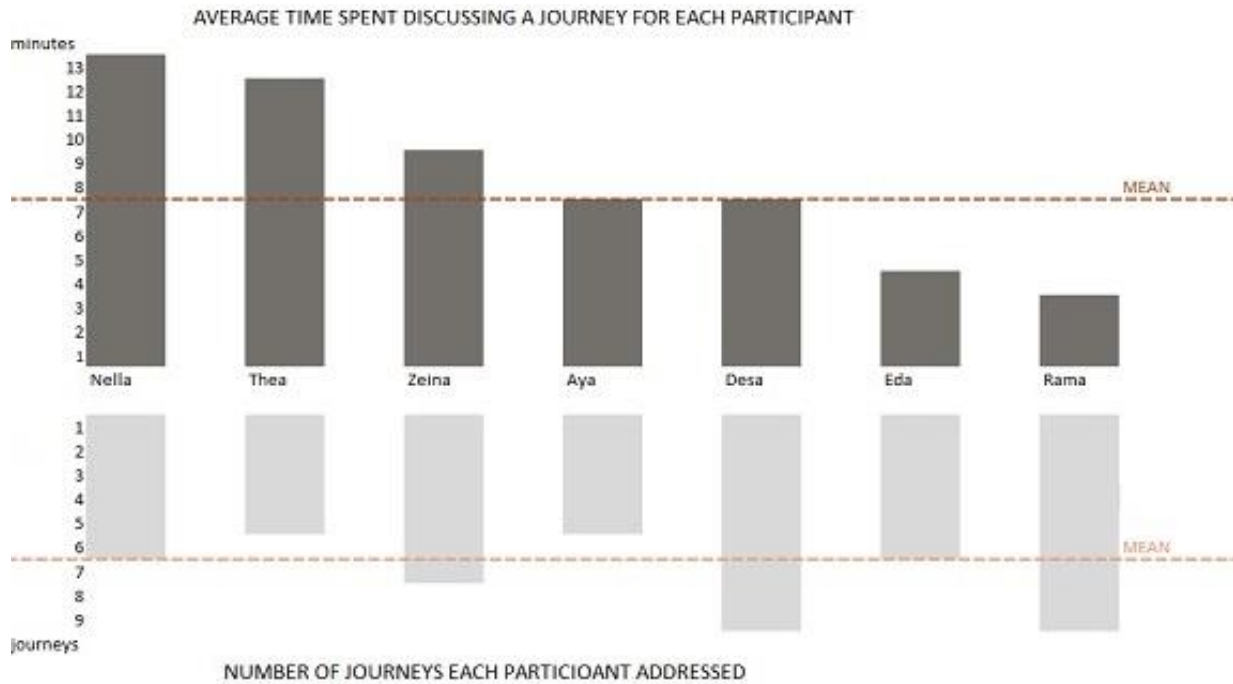| Frequency of map use			
	Humanitarian	Cycle	Transport	Neutral
Journey tracking	23	21	21	7
Multichoice	2	3	4	3
Supporting features use			
Speed	Diary	Scatterplot	
40	31	26	

Figure 9: This table is in two sections. The top section contains aggregate numbers for map use by type and by journey choice. We can see that participants preferred to examine single journey and that the humanitarian map was the most used, while neutral was used the least. Of the supporting features, speed tracking was the most used.

Further, only one participant chose Cycle OSM map as their first map as majority commented that it "gives too much detail". However, we can see in the Fig. 9 that six out of seven participants used it throughout the interview despite their initial reluctance. Participant A only used the Humanitarian map as it "looks more familiar". The Humanitarian map was the most frequently overall, as we can see in the table depicted in Fig 9. Neutral map, that contained the least embedding, was also used the least. The most utilised feature was the speed tracking and the least scatterplot as the time frame and the ride frequency were not long enough, and complex enough to require deeper analysis or to hide patterns.
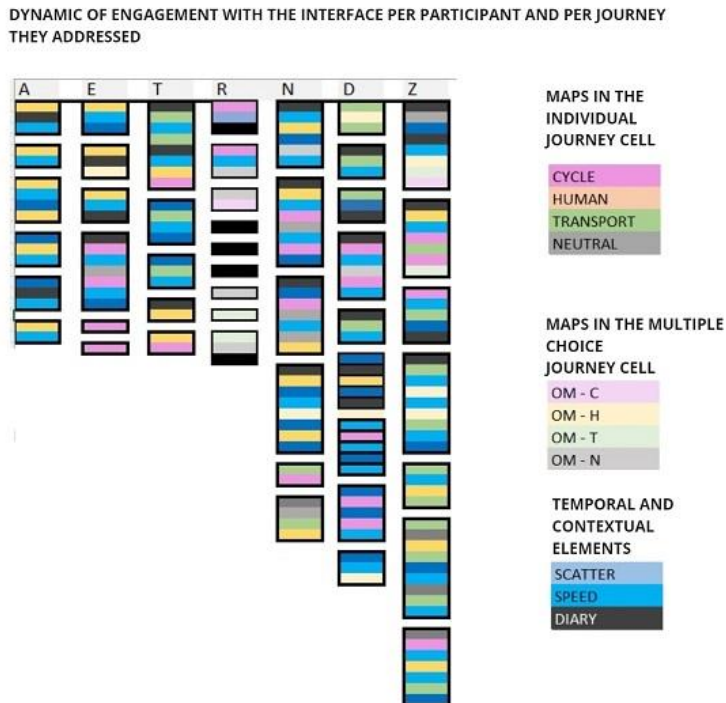
Figure 10: Dynamics of engagement per journey and per participant. Each column is one participant and each block is one journey they discussed. The legend on the right gives us the encodings for the elements of the data notebook.

AVERAGE TIME SPENT DISCUSSING A JOURNEY FOR EACH PARTICIPANT

NUMBER OF JOURNEYS EACH PARTICIOANT ADDRESSED

Figure 11: Number of journeys discussed by each participant. The top bar chart shows average time the participant has spent discussing journey, while the bottom bar chart shows the number of journeys the participant recorded. The humanitarian map has had the relevant prompt. (We have used pseudonyms in order to protect the participant's anonymity.)

3.4 Cycling Habits

As we established, the cohort was diverse in cycling proficiency. Despite variations, there were common motivators for cycling among the participants. The frequency of specific journey types was determined based on the count of participants engaging in them. Six out of seven participants engaged in cycling for well-being, which included fitness, recreation, and mental health purposes. Examples included extending cycling time or making detours for solitude and respite. Only one participant primarily focused on care journeys and did not make any well-being rides. Five out of seven participants engaged in social bonding journeys, either with organized groups or with friends and family. Three participants participated in community engagement activities, which sometimes overlapped with social bonding. Utility, commuting, and care journeys were less frequent, (Fig 11).

Activity	Total
Well-being	6
Social bonding	5
Community engagement	3
Utility	2
Commute	2
Care	2

Figure 12: This table shows which type of cycling the participants engaged in. All, bar one participants cycled for well-being and only two used bicycles for utility, care or commuting.

The interviews conducted for thematic analysis revealed additional themes (Fig. 12) that were not directly related to motivations and cycling purposes. These themes were expressed by specific subgroups within the cohort, aligning with the cycling competency classification. The most frequent overarching themes identified were independence, well-being, social bonding, fear of attack at certain stretches, and a preference for circular routes.

Universal Themes	Total
Independence	6
Documenting rides	6
Safety from attack	5
Preference for circular route	5
Flexibility	4
Preference for early mornings	4
The preference for side roads	2

Figure 13: A table of general themes identified using thematic analysis.

However, there were specific themes that emerged only in interviews with intermediate and beginner riders. The most common theme among them was the impact of organized rides. Some participants had recently benefited from such rides, while others were actively searching for them as there were none available in their area. For example, Rama cycles the route they were introduced to by the group member on a single occasion and she repeats the same route every morning but she has no confidence to expand on it by herself while Thea cycles either with the group or with friends she has met on the group's rides.

Another strategy observed among beginner and non-confident cyclists is non-peak-time cycling. During quiet periods like early mornings and weekends, they take the opportunity to familiarize themselves with the environment or simply enjoy cycling. Exploration is also common, where cyclists engage in trial and error to find preferred routes. Lack of signage remains a common issue for all cyclists, especially for those new to London or new to cycling in the city. Counterintuitively, less experienced cyclists in this study tended to cycle longer routes compared to more experienced ones, regardless of time constraints.

Intermediate and Beginner Themes	Total
The effect of organized rides	4
Non-peak time cycling	3
Exploration	3
Longer safer	2
Cycling expertise	2

Figure 14: A table of themes specific to intermediate and beginner cyclists.
They acknowledge the importance of having a supporting infrastructure. They use exploration and cycling in non-peak times to acclimatize to the environment. They use exploration to re-learn their environment and will go a longer route if they consider it safer.
There is also a need to acquire cycling expertise

Lastly, the theme of cycling expertise emerged, encompassing knowledge about safe routes, suitable bicycles, cycle purchasing schemes, and reliable repair places with good bike locks. This knowledge can be transformative for new cyclists, Clara remarked that buying a good lock has opened up new possibilities for her.

4 Discussion

The most surprising finding of the study was that only one participant used the bicycle for care journey or trip-chaining. The motivation for cycling does not appear to be care of others but self-care and cycling for well-being (Ravensbergen, Buliung and Sersli, 2020; Sersli *et al.*, 2020). Only one participant, who is a mother to a young family, did not explicitly prioritize well-being trips, which aligns with the challenges faced by young mothers in engaging in self-care activities (Ravensbergen, Buliung and Sersli, 2020; Sersli *et al.*, 2020). Nevertheless, this participant highlighted the increased independence and mobility that cycling provided, which positively impacted her well-being (Glackin and Beale, 2018).

A prominent theme observed among the participants was the fear of attack in parks and secluded areas, which is not extensively discussed in Western research. However, a study in Solo, Indonesia, found that violence against women cyclists is a major barrier to cycling for the majority of women (Song, Kirschen and Taylor, 2019). The lack of available data on attacks against cyclists in the UK further underscores the marginalization and power imbalance faced by cyclists (Pucher, 2001; Horton, 2006; Chen *et al.*, 2012; Schepers *et al.*, 2014; Adams, 2015; Pedroso *et al.*, 2016). This further illustrates the lack of inclusion of the female perspective when planning and developing cycling infrastructure in London as a great proportion of the dedicated cycle paths run through paths and on the towpaths which are dark and deserted after dark (which is 4.00 pm in winter). The findings also have implications on the city and cycling provision layout beyond safety concerns as the urban structure is poorly suited for social cycling, cycling for introspection, and especially for novice riders. If we are to bridge the gap between men and women cycling, we need to modify cities in a way that would enable more women to learn to cycle and immerse themselves in an environment that, at the moment, is hostile to beginners.

Another identified theme is the preference for round journeys, where participants choose different routes for their return trips. These preferences and safety concerns can influence inclusive city planning efforts (Lam, 2022). The seasonality of cycling experiences, both in terms of time of day and year is also not accounted for in urban planning but is a major mobility factor.

Cycling advocacy groups were found to play a crucial role in normalizing cycling, providing support and knowledge for individuals at different stages of cycling proficiency (Maskell *et al.*, 2018). This seems to be true for women cyclists of varied abilities as the groups share skills, train, and provide positive modelling and social scaffolding necessary for continual engagement with cycling.

The evaluation of the interface used in the study, which aimed to elicit insights and narratives, presented challenges in quantitative measurement. While the diary was consulted multiple times, its effectiveness varied. On the other hand, the speed-tracking aspect of the interface provided useful information and helped identify key areas of discussion. Combining movement with environmental representation proved to be an effective method for engaging participants and stimulating recollection, aligning with the link between motion, abstraction, and memory (Tversky, 2019).

The study has shown that mobility capture, visualization, and discussion rooted in the person's mobility reality are effective ways of gathering new insights and discovering new avenues of research. While it might be challenging to run the study on a large scale, it is an effective way of exposing new avenues for exploration and new themes.

References

Adams, J. (2015) 'Cycling and Safety: change must take root in people's minds', World Transport Policy and Practice, 21.3, pp. 10–23.

Agnew, J.A. (2011) 'Space and Place', in D. Livingstone (ed.) Handbook of Geographical Knowledge. London: Sage, p. 34.

Aldred, R., Croft, J. and Goodman, A. (2018) 'Impacts of an active travel intervention with a cycling focus in a suburban context: One-year findings from an evaluation of London's in-progress mini-Hollands programme', Transportation Research Part A: Policy and Practice [Preprint].

Aldred, R. and Dales, J. (2017) 'Diversifying and normalising cycling in London, UK: An exploratory study on the influence of infrastructure', Journal of Transport and Health, 4, pp. 348–362. Available at: https://doi.org/10.1016/j.jth.2016.11.002.

Alta (2017) Level of Traffic Stress — What it Means for Building Better Bike Networks, Alta Innovation Lab. Available at: https://blog.altaplanning.com/level-of-traffic-stress-what-it-means-for-building-better-bike-networks-c4af9800b4ee (Accessed: 1 April 2019).

Beecham, R. and Wood, J. (2014) 'Characterising group-cycling journeys using interactive graphics', Transportation Research part C: Emerging Technologies, (47), pp. 194–206.

Beecham, R., Wood, J. and Bowerman, A. (2014) 'Studying commuting behaviours using collaborative visual analytics', Computers, Environment and Urban Systems, 47, pp. 5–15. Available at: https://doi.org/10.1016/j.compenvurbsys.2013.10.007.

Bishop, F. et al. (2020) 'Construct-A-Vis: Exploring the free-form visualization processes of children', IEEE Transactions on Visualization and Computer Graphics, 26(1), pp. 451–460. Available at: https://doi.org/10.1109/TVCG.2019.2934804.

Boakye, K.A. et al. (2021) 'GPS-based built environment measures associated with adult physical activity', Health and Place. Elsevier Ltd, 70(March), p. 102602. Available at: https://doi.org/10.1016/j.healthplace.2021.102602.

Börjesson, M. et al. (2018) 'Do buses hinder cyclists or is it the other way around? Optimal bus fares, bus stops and cycling tolls', Transportation Research Part A: Policy and Practice, 111(January), pp. 326–346. Available at: https://doi.org/10.1016/j.tra.2018.03.023.

Bostock, M. (2017) Observable, Observable. Available at: https://observablehq.com/@mbostock/introduction (Accessed: 19 May 2023).

Braun, V. and Clarke, V. (2013) Successful Qualitative Research: A Practical Guide for Beginners - Virginia Braun, Victoria Clarke - Google Books. Sage PublicationsSage CA: Los Angeles, CA.

Caimotto, M.C. (2020) Discourse of cycling, road users and sustainability: an ecolinguistic investigation. Spring, Nature.

Chen, L. et al. (2012) 'Evaluating the Safety Effects of Bicycle Lanes in New York City', American Journal of Public Health, 102(6), pp. 1120–1127. Available at: https://doi.org/10.2105/AJPH.2011.300319.

Craig, N.P. and Norton, K.I. (2001) 'Characteristics of track cycling (Craig, N.P. & Norton, K.I. -2001-)', Sports Medicine, 31(7), pp. 457–468.

Criado-Perez, C. (2019) Invisible women: Exposing data bias in a world designed for men. Chatto & Windus, London.

Department for Transport (2021) The impact of the coronavirus pandemic on walking and cycling statistics.

Douglas, J. (2021) 'Comment on: "Using Field Based Data to Model Sprint Track Cycling Performance"', Sports Medicine - Open, 7(1). Available at: https://doi.org/10.1186/s40798-021-00348-0.

Emond, C.R., Tang, W. and Handy, S.L. (2009) 'Explaining gender difference in bicycling behavior', Transportation Research Record, (2125), pp. 16–25. Available at: https://doi.org/10.3141/2125-03.

Faugier, J. and Sargeant, M. (1997) 'Sampling hard to reach populations', Journal of Advanced Nursing, 26(4), pp. 790–797. Available at: https://doi.org/10.1046/j.1365-2648.1997.00371.x.

Fessenden, T. (2018) 'Scrolling and Attention', Nielsen Norman Group.

Figus, A. (2020) 'Coronavirus COVID - 19, a complex issue between health, economy, politics, and communication', Geopolitical, Social Security and Freedom Journal, 3(1), pp. 1–13. Available at: https://doi.org/10.2478/gssfj-2020-0001.

Gamble, J., Snizek, B. and Nielsen, T.S. (2017) 'From people to cycling indicators: Documenting and understanding the urban context of cyclists' experiences in Quito, Ecuador', Journal of Transport Geography, 60, pp. 167–177. Available at: https://doi.org/10.1016/j.jtrangeo.2017.03.004.

Glackin, O.F. and Beale, J.T. (2018) '"The world is best experienced at 18 mph". The psychological wellbeing effects of cycling in the countryside: an Interpretative Phenomenological Analysis', Qualitative Research in Sport, Exercise and Health, 10(1), pp. 32–46.

Goel, R., Goodman, A., et al. (2022) 'Cycling behaviour in 17 countries across 6 continents: levels of cycling, who cycles, for what purpose, and how far?', Transport Reviews, 42(1), pp. 58–81. Available at: https://doi.org/10.1080/01441647.2021.1915898.

Goel, R., Oyebode, O., et al. (2022a) 'Gender differences in active travel in major cities across the world', Transportation, 50(2), pp. 733–749. Available at: https://doi.org/10.1007/s11116-021-10259-4.

Goel, R., Oyebode, O., et al. (2022b) 'Gender differences in active travel in major cities across the world', Transportation, 50(2), pp. 733–749. Available at: https://doi.org/10.1007/s11116-021-10259-4.

Gu, J. et al. (2017) 'Privacy concerns for mobile app download: An elaboration likelihood model perspective', Decision Support Systems, 94, pp. 19–28. Available at: https://doi.org/10.1016/j.dss.2016.10.002.

Gunthert, K.C. and Wenze, S.J. (2012) 'Daily diary methods', in M.R. Mehl and T.S. Conner (eds) Handbook of research methods for studying daily life. The Guildford Press, pp. 144–159.

Handy, S., van Wee, B. and Kroesen, M. (2014) 'Promoting Cycling for Transport: Research Needs and Challenges', Transport Reviews, 34(1), pp. 4–24. Available at: https://doi.org/10.1080/01441647.2013.860204.

Hassandoust, F., Akhlaghpour, S. and Johnston, A.C. (2021) 'Individuals' privacy concerns and adoption of contact tracing mobile applications in a pandemic: A situational privacy calculus perspective', Journal of the American Medical Informatics Association, 28(3), pp. 463–471. Available at: https://doi.org/10.1093/jamia/ocaa240.

Heckman, J.J. (2013) 'Selection Bias and Self-selection', The New Palgrave Dictionary of Economics, 2012 Version, pp. 201–202. Available at: https://doi.org/10.1057/9781137336583.1619.

Hong, J., McArthur, D. and Raturi, V. (2020a) 'Did safe cycling infrastructure still matter during a COVID-19 lockdown?', Sustainability (Switzerland), 12(20), pp. 1–16. Available at: https://doi.org/10.3390/su12208672.

Hong, J., McArthur, D. and Raturi, V. (2020b) 'Did safe cycling infrastructure still matter during a COVID-19 lockdown?', Sustainability (Switzerland), 12(20), pp. 1–16. Available at: https://doi.org/10.3390/su12208672.

Horton, D. (2006) 'Environmentalism and the bicycle', Environmental Politics, 15(1), pp. 41–58. Available at: https://doi.org/10.1080/09644010500418712.

Jacobsen, P.L. (2003) 'Safety in numbers: More walkers and bicyclists, safer walking and bicycling', Injury Prevention, 9(3), pp. 205–209. Available at: https://doi.org/10.1136/ip.9.3.205.

Jordan, B. and Henderson, A. (1995) 'Interaction Analysis: Foundations and Practice', Journal of the Learning Sciences, 4(1), pp. 39–103. Available at: https://doi.org/10.1207/s15327809jls0401_2.

Krizek, K.J. (2018) 'Measuring the wind through your hair? Unravelling the positive utility of bicycle travel', Research in Transportation Business and Management, 29, pp. 71–76. Available at: https://doi.org/10.1016/j.rtbm.2019.01.001.

Lam, T. (2022) 'Towards an Intersectional Perspective in Cycling', Active Travel Studies, 2(1), pp. 1–11. Available at: https://doi.org/10.16997/ats.1264.

Lam, T.F. (2018) 'Hackney: a cycling borough for whom?', Applied Mobilities, 3(2), pp. 115–132. Available at: https://doi.org/10.1080/23800127.2017.1305151.

Maskell, T. et al. (2018) 'Spokespeople: Exploring routes to action through citizen-generated data', Conference on Human Factors in Computing Systems - Proceedings, 2018-April, pp. 1–12. Available at: https://doi.org/10.1145/3173574.3173979.

Moran, S.K. et al. (2018) 'Lowering Bicycle Stress One Link at a Time: Where Should We Invest in Infrastructure?', Transportation Research Record, 2672(36), pp. 33–41. Available at: https://doi.org/10.1177/0361198118783109.

Munzner, T. (2014) Visualization Analysis and Design. Edited by T. Munzner. CRC press.

Neves, A. and Brand, C. (2019) 'Assessing the potential for carbon emissions savings from replacing short car trips with walking and cycling using a mixed GPS-travel diary approach', Transportation Research Part A: Policy and Practice, 123(August 2018), pp. 130–146. Available at: https://doi.org/10.1016/j.tra.2018.08.022.

Nguyen, T., Colman, A. and Han, J. (2013) Web Information Systems Engineering – WISE 2011 and 2012 Workshops, Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics).

Nicola, P. Di, Ruspini, E. and Nicola, P. Di (2020) 'Family and Family Relations at the Time of COVID-19: An Introduction', Italian Sociological Review, 10(3), pp. 679–685.

Niess, J. et al. (2020) 'Exploring fitness tracker visualisations to avoid rumination', Conference Proceedings - 22nd International Conference on Human-Computer Interaction with Mobile Devices and Services: Expanding the Horizon of Mobile Interaction, MobileHCI 2020 [Preprint]. Available at: https://doi.org/10.1145/3379503.3405662.

Nikitas, A. et al. (2021) 'Cycling in the era of covid-19: Lessons learnt and best practice policy recommendations for a more bike-centric future', Sustainability (Switzerland), 13(9). Available at: https://doi.org/10.3390/su13094620.

Oja, P. et al. (2011) 'Health benefits of cycling: a systematic review.', Scandinavian journal of medicine & science in sports, 21(4), pp. 496–509. Available at: https://doi.org/10.1111/j.1600-0838.2011.01299.x.

Pajarito, D. and Gould, M. (2018) 'Mapping Frictions Inhibiting Bicycle Commuting', ISPRS International Journal of Geo-Information, 7(10), p. 396.

Panis, L.I. (2011) 'Cycling: Health Benefits and Risks', Environmental Health Perspectives, 119(3), p. 48. Available at: https://doi.org/10.1289/ehp.1003227.

Pedroso, F.E. et al. (2016) 'Bicycle Use and Cyclist Safety Following Boston's Bicycle Infrastructure Expansion, 2009–2012', American Journal of Public Health, 106(12), pp. 2171–2177. Available at: https://doi.org/10.2105/AJPH.2016.303454.

Psallidas, F. and Wu, E. (2018) 'Provenance for interactive visualizations', Proceedings of the Workshop on Human-In-the-Loop Data Analytics, HILDA 2018 [Preprint]. Available at: https://doi.org/10.1145/3209900.3209904.

Pucher, J. (2001) 'Cycling Safety on Bikeways vs. Roads', Transportation Quarterly, 55(4), pp. 9–11.

Pucher, J. and Buehler, R. (2017) 'Cycling towards a more sustainable transport future', Transport Reviews, 37(6), pp. 689–694. Available at: https://doi.org/10.1080/01441647.2017.1340234.

Ravensbergen, L., Buliung, R. and Laliberté, N. (2019) 'Toward feminist geographies of cycling', Geography Compass, 13(7), pp. 1–24. Available at: https://doi.org/10.1111/gec3.12461.

Ravensbergen, L., Buliung, R. and Sersli, S. (2020a) 'Vélomobilities of care in a low-cycling city', Transportation Research Part A: Policy and Practice, 134, pp. 336–347. Available at: https://doi.org/10.1016/J.TRA.2020.02.014.

Ravensbergen, L., Buliung, R. and Sersli, S. (2020b) 'Vélomobilities of care in a low-cycling city', Transportation Research Part A: Policy and Practice, 134, pp. 336–347. Available at: https://doi.org/10.1016/J.TRA.2020.02.014.

Rosenholtz, R., Li, Y. and Nakano, L. (2007) 'Measuring visual clutter', Journal of Vision, 7(2), pp. 1–22. Available at: https://doi.org/10.1167/7.2.17.

Schepers, P. et al. (2014) 'A conceptual framework for road safety and mobility applied to cycling safety', Accident Analysis and Prevention, 62, pp. 331–340. Available at: https://doi.org/10.1016/j.aap.2013.03.032.

Schneider, A. (2019) GPS Visualiser. Available at: https://www.gpsvisualizer.com.

Schneider, F., Daamen, W. and Hoogendoorn, S. (2022) 'Trip chaining of bicycle and car commuters: an empirical analysis of detours to secondary activities', Transportmetrica A: Transport Science, 18(3), pp. 855–878. Available at: https://doi.org/10.1080/23249935.2021.1901793.

Sersli, S. et al. (2020) 'Riding alone and together: Is mobility of care at odds with mothers' bicycling?', Journal of Transport Geography, 83. Available at: https://doi.org/10.1016/J.JTRANGEO.2020.102645.

Song, L., Kirschen, M. and Taylor, J. (2019) 'Women on wheels: Gender and cycling in Solo, Indonesia', Singapore Journal of Tropical Geography, 40(1), pp. 140–157. Available at: https://doi.org/10.1111/sjtg.12257.

Spinney, J. (2020a) Understanding Urban Cycling, Understanding Urban Cycling. Routledge. Available at: https://doi.org/10.4324/9781351007122.

Spinney, J. (2020b) Understanding Urban Cycling, Understanding Urban Cycling. Routledge. Available at: https://doi.org/10.4324/9781351007122.

Steinbach, R. et al. (2011) 'Cycling and the city: A case study of how gendered, ethnic and class identities can shape healthy transport choices', Social Science and Medicine, 72(7), pp. 1123–1130. Available at: https://doi.org/10.1016/j.socscimed.2011.01.033.

Tamura, K. et al. (2019) 'Accelerometer and GPS Data to Analyze Built Environments and Physical Activity', Research Quarterly for Exercise and Sport, 90(3), pp. 395–402. Available at: https://doi.org/10.1080/02701367.2019.1609649.

Transport for London (2018) Travel in London. London.

Tversky, B. (2019) Mind in motion: How action shapes thought. Hatchette, UK.

Waitt, G. and Buchanan, I. (2023) 'Velomobilities: Cycling geographies and well-being', Geography Compass, 17(1), pp. 1–13. Available at: https://doi.org/10.1111/gec3.12672.

Wood, J., Beecham, R. and Dykes, J. (2014) 'Moving beyond sequential design: Reflections on a rich multi-channel approach to data visualization', IEEE Transactions on Visualization and Computer Graphics, 20(12), pp. 2171–2180. Available at: https://doi.org/10.1109/TVCG.2014.2346323.

Wood, J., Kachkaev, A. and Dykes, J. (2019) 'Design Exposition with Literate Visualization', IEEE Transactions on Visualization and Computer Graphics, 25(1), pp. 759–768. Available at: https://doi.org/10.1109/TVCG.2018.2864836.

Zhou, Z. et al. (2019) 'Visual Abstraction of Large Scale Geospatial Origin-Destination Movement Data', IEEE Transactions on Visualization and Computer Graphics, 25(1), pp. 43–53. Available at: https://doi.org/10.1109/TVCG.2018.2864503.

Thematic Field E:

Mobility and Logistics: A Socio-Technical System on the Way to Sustainability

Who Trusts Automated Vehicles? Investigating Tensions in Automated Driving Imaginaries.

T. Zenkl[1] and M. Griesbacher[1]

[1]Institute of Sociology, University of Graz, Austria

Abstract. The ongoing automatization of driving tasks is accompanied by manifold imaginations of future mobilities and corresponding expectations and concerns, that shape acceptance and foster (or hinder) trust. Although road registration of automated vehicles has repeatedly been postponed into undefined futures, the formation of trust, we argue, is already being shaped by anticipating their prospective affordances, which are based upon discourses around automatization in general as well as societal problems and possibilities associated with and arising from automated driving technologies. Our research points out that expected benefits of automated driving systems (ADS) are distributed unequally within societal groups, reinforcing notions of digital inequalities. As a key explaining factor, we discuss the role of *technology affinity* for the future adoption of new technologies and reveal the prevalent "tensions" of anticipated imaginaries that drive today's expectations towards ADS: A notion of an algorithmically established "posthuman security" that guarantees safety by eradicating human error and the simultaneous perception of automations "overstepping" their legitimate algorithmic autonomy at the expense of human agency.

1 Introduction

The persistent debate around automated driving systems (ADS) within scientific and public discussions revolves around numerous discursive narratives: the (im)possibilities of implementing "autonomous" vehicles, the polarized debate around safety benefits and the simultaneous emergence of new risks under algorithmic control, the promise of ecological alternatives to contemporary transportation systems, the redundancy and obliteration of human supervision and autonomy, the ultimate eradication of an already contested privacy (Kaur and Rampersad, 2018), and the further deepening of digital divides (Fussey and Roth, 2020). Without going into detail about the actual implementation of this technology and its surrounding "politics of buzzwords" (Bensaude-Vincent, 2014), our contribution asks how people's trust in future technical innovations already manifests itself in the present, what is structuring the assessment of trustworthiness and therefore "who trusts automated vehicles?"

1.1 Automated Driving

ADS bear the promise of making driving and road traffic safer, more efficient and ecological; increase productivity by allowing work to be done whilst commuting, attending virtual meetings or simply relaxing on long drives; make mobility more inclusive for marginalized groups (esp. elderly drivers and people with disabilities) and make private car ownership obsolete by providing "mobility as a service" – in short – revolutionize current forms of mobility and shift contemporary paradigms of transportation towards the "road to *autopia*" (Hancock, 2019, p. 3). These seemingly utopian visions, carefully crafted by the automotive industry to expand their business models into new (datafied) realms and promising billions in revenue (McKinsey, 2023), are being partially shared by the European Union and other governmental bodies that identify the potential of additional safety effects delivered by automation to contribute towards the "vision zero" of a near casualty-free road traffic by 2050 (European Commission, 2023). However, as recent years have presented several milestones in automating isolated driving tasks, media attention, triggered by the perceived dangers arising and the emergence of unwanted consequences thwarting the rather positive expectations, was often focused on the negative side effects. Erring systems leading to wrong or even fatal decisions while drivers are degraded to helpless "users" deprived of agency and unable to intervene, excessive surveillance and an erosion of privacy due to the constant need for precise sensor data analysis, as well as cybersecurity threats caused by novel attack vectors resulting from networking with other road users and infrastructure. As a key feature that sets it apart from other trends in automation, the extent of safety risks posed by vehicles with ADS in mundane interactions with everyday road-traffic and the public sphere in general that are hardly to be avoided is particularly striking and gives rise to reservations. As a reaction, the question of the "trustworthiness" of ADS and thus how people not only accept new and potentially harmful technologies, but indeed trust them, arose within wider academic and industrial communities.

1.2 Trust in automated vehicles

Despite technical hurdles, legislative setbacks, and a lack of approvals for road traffic still hindering the deployment of ADS, media attention and academic interest have already sparked extensive questions around how users experience trust towards the automation of driving tasks and how their acceptance is publicly negotiated. While in an everyday understanding, these terms often appear to be interchangeable, we want to highlight their conceptual difference: acceptance can be habitual, a learned and nonreflexive experience resulting from everyday encounters, mediated through societal norms and/or power relations and may result merely from the lack of a better option, even when trust is absent.

Considering the conceptual components of trust (Zenkl and Griesbacher, 2020), we can conclude that trust, as a mutual faithfulness on which all social systems ultimately depend upon (Lewis and Weigert, 1985), that shapes expectations and hence serves as a function of complexity reduction (Luhmann, 2017), should not only be considered a central concept for interaction between humans, but also as an important mediator of relations with non-human entities. Furthermore, "trust must be conceived as a property of *collective units* [...], not of isolated individuals" (Lewis and Weigert, 1985, p. 978) and should therefore be conceptionally expanded from narrow theoretical (e.g. psychological) limits. Just as societies are built on trust, trust in technology is socially mediated and embedded in complex socio-technical settings at the intersection of human and non-human activities. As a defining feature of all interactions and a result of inherent situational uncertainty, trust, in our understanding, is an integral part of the facilitation of technology that becomes especially relevant when interacting with non-deterministic technologies based on algorithmic decision making. Acting with relative "autonomy", endowed with the capacity for "reactivity", oriented towards activities ("pro-activeness") and with reference to other agents ("sociability"), modern automated systems remain algorithmic in the sense that they don't qualify as moral actors (Rammert, 2003), but open up increasing degrees of freedom for their outputs, which alter the quality of the associations people have with them. As a "growing source of and factor in social order, in a shared social reality [...] which is increasingly being co-constructed by automated algorithmic selection" (Just and Latzer, 2017, p. 254) on the internet and beyond, algorithmic actors are steadily approaching phenomenological parity with human actors and therefore must be analytically taken into account by attributing qualities formerly reserved for human relationships to those with algorithmic actors.

Trust, as a property of relations and facilitator of interactions that mediates (uncertain and potentially harmful) interactions between human, artificial and/or hybrid agents and changes the way in which these actions occur (Taddeo, 2017), is not static, but requires constant adjustment and *calibration*, as inappropriate trust ("over-trust") can lead to a system's misuse or abuse, and too little trust ("under-trust") to its rejection, i.e. non-use (Lee and See, 2004). It should therefore be clear that the ongoing automatization of driving tasks, an undertaking which is associated above all with the risks involved, must necessarily be based on trust to be steadily adopted; as Hancock (2019, p. 10) concludes: the "primary penetration rate of automated vehicles into near-term markets will be directly contingent on, and dominantly controlled by perceived trust". However, both automatization and the calibration of trust towards it must be understood as processual. While questions surrounding trust in ADS often focus on sudden *trolley problems* of anticipated "autonomous" vehicles, the gradual nature of the automatization of driving functions is often neglected. Crucial for ADS classification but rarely considered in both public discourse and marketing communication, is the level of automation defined

by SAE (Society of Automotive Engineers), ranging from level 0 (no driving automation) to 5 (full driving automation) and representing a range of possible steps in between, each describing the functions and corresponding roles and responsibilities of users (SAE International, 2021). While under current legislation, vehicles implementing functions with SAE Level 3[75] might apply for road registration in certain countries, labels for automation services such as "full-self driving" or "autopilot" have been criticised for suggesting more capabilities than they are able to provide and inspiring a false sense of confidence ("over-trust") among users.

Since these assessments of trustworthiness are, in the case of dynamic algorithmic technologies, directed towards systems that, due to their complexity and/or (intended) opacity, often cannot be fully understood by users, their encounters are being structured by "imaginaries" (Bucher, 2017) that mediate their affordances (Davis, 2020) as an epistemic rational for the explanation of what they enable and constrain. However, trustworthiness is being shaped already prior to a technology's existence and real-life encounters, a process leading to "dispositional trust" (Hoff and Bashir, 2015), that subsequently shapes and steers it's future "domestication" (Hirsch and Silverstone, 2003), i.e. its embedding and use in practice. During this "imagination phase", characterised by the absence of practical knowledge and experience, people rely on public discourses between advertisement, media, as well as cultural and societal ideals to construct and assign meaning to a technology and mark it's "boundary between fantasy and reality" (Silverstone, 1994, pp. 125–126). In this process, actors anticipate affordances in the sense that they speculate on what possibilities for action an artefact might offer to them in the future. Opinions derived from these considerations then "bracket these speculations as analytically distinct from explorations of actual affordances" (Johannessen, 2023, p. 4) in order to draw conclusions about a technology's desirability – regardless of its actual performance or possibilities. To understand how future innovations are already being discursively shaped in the present and to conclude our theoretical framework, we argue that trust is a necessary property of relating to and acting with technologies that forms from users' assessments of trustworthiness. Since currently only limited experiences with ADS are available, and, due to the uncertainty of development paths, no objective evaluation of emerging risks and opportunities is possible, we can instead focus on imaginaries that mediate the assessment of trustworthiness to understand how (un)trustful relationships are being structured already today. These imaginaries, consisting of anticipations of how ADS are expected to function and associations with emerging societal problems and opportunities

---

[75] SAE Level 3 describes a conditional automation in which an ADS controls all aspects of a current driving task while human drivers are expected to intervene when requested by the automation (SAE International, 2021).

associated with them, can be operationalized as expectations and concerns of their anticipated affordances.

1.3 Public Opinions & Vulnerable Road Users

As a technology that has the potential to not just influence individual mobility patterns but affect road traffic for everyone participating in it and entire mobility regimes, the analytical examination of trust cannot be limited to those who anticipate actively using ADS in the future. Although the perspectives of other (vulnerable) road users have received increasing attention in recent research (Saleh, Hossny and Nahavandi, 2017; Jayaraman *et al.*, 2018, 2019), their role in the discursive negotiation of ADS and the resulting shaping of imaginaries was, and often is still, only treated peripherally in favour of drivers' perspectives. Even when pedestrians, cyclists or passengers are recognized as an important group in road traffic, their trust and acceptance is often researched as momentary interactions detached from the social and cultural influences that define, shape and lead these groups to their embodied experiences of technologies (with some exceptions, see e.g. Yerdon *et al.*, 2016; Hulse, Xie and Galea, 2018; Schmidt *et al.*, 2019; Raats, Fors and Pink, 2020).

The importance of a broader societal perspective in the formation of trust towards new technologies is especially relevant when considering its widespread and disruptive effects at all ends of the imaginative spectrum that go far beyond the immediate impacts on road traffic and its users. Transformation processes associated with ADS concern a shift in workforce (skilled instead of unskilled labour) and the disruption of labour markets (Nikitas, Vitel and Cotet, 2021), settlement patterns and urban land use (Heinrichs, 2016), car ownership structures (Mourad, Puchinger and Chu, 2019) and effects on ecosystems through emissions and pollution (Silva *et al.*, 2022).

While market research is prone to neglect people whose trust is not directly involved in the decision to use ADS, these actors can exert significant force, either in the active exercise of their democratic power thus influencing legislation or by their participation in the discursive shaping of imaginaries. This is especially relevant when considering reports around potential dangers for certain demographics, as activists demonstrated by revealing a series of tests on Tesla's "Full Self-Driving" software and showing it is seemingly unable to correctly identify children (The Dawn Project, 2022). The realisation of ADS's predicted benefits, therefore, depend on the trusting uptake of this technology, which in turn relies on the public imaginaries that form around them (Regan *et al.*, 2017).

1.4 Who Trusts Automated Vehicles?

As different groups of stakeholders are affected differently by the implementation of novel technologies, so their expectations and concerns differ, not only between usage scenarios, but also along demographic and cultural lines. Gender seems to be an important factor structuring expectations of ADS, with men generally being more optimistic and associating ADS with benefits more than concerns (Schoettle and Sivak, 2014; European Commission And European Parliament, 2018; Hulse, Xie and Galea, 2018; European Commission, 2020). Age is another important factor, with older people commonly anticipating fewer benefits and expressing more concerns over ADS (Nees, 2016; Deb et al., 2017; Bansal and Kockelman, 2018).

Trust in ADS is stratified along sociodemographic and cultural lines and contested in polarized discourses between industry narratives and public debate. Disregarding the technological hurdles of their actual feasibility, our contribution wants to raise the question of "who trusts automated vehicles?" by quantitatively operationalizing common imaginaries of automated mobility solutions along their anticipated expectations and concerns. It is based on our assumptions that trust is a necessary precondition for the adoption of any new technology; that the negotiation of such trust is rooted in specific societal conditions and starts even before first hand experiences with concrete artifacts are available; and finally, that a broad spectrum of affected stakeholders, not just those anticipating a future uptake, must be considered when analysing the formation of (dis)trust. To be more precise, and because a comprehensive discussion of the survey material is not possible within the scope of this text[76], we address the question of the antecedents of trust by focussing on one central dimension and precondition for the formation of attitudes towards innovation: affinity for technology. As a personality trait that expresses itself in a positive attitude, enthusiasm and confidence of a person towards technology (Karrer-Gauß et al., 2009), affinity for technology has been identified as a key factor for the uptake of certain technologies (e.g. Winter, Chudoba and Gutek, 1998). However, in ADS's current "imagination phase", we see anticipated imaginaries not as mere hallucinations detached from the actual development, which only collide with the "hard reality" after a technology's materialization, but as productive and influenced by an affinity for technology in the here and now. Therefore, the process of reciprocal calibration of imaginaries, affordances and materialities does not take place in a social vacuum but is based on pre-existing associations of and experiences with technologies, which are then reflected in the actor's personal affinity for them. This is where our research questions are located: under the premise that the positive reference to technological innovations in the present has an impact on the willingness to perceive

---

[76] See Section 2 for a detailed description of the questionnaire and argumentation for why other dimensions had to be neglected within this contribution.

them as trustworthy in the future, we ask what role an affinity for technology plays in the anticipation of ADSs trustworthiness and how imaginations are structured by it accordingly:

- What role does an affinity for technology play in structuring anticipated imaginaries and affordances of future technologies?
- Does an affinity for technology account for a consistent reference to expected improvements (and thus a homogeneous and one-sided image of automation), or are contradictory elements also integrated into these imaginaries?

2 Methodology

The research was conducted within the interdisciplinary project VERDI[77] (2019-2021). Initially focussed on ADS implementing SAE Lv. 3 (that at the time appeared close to being marketable), the understanding of trust as a gradual process forming along different levels of automatization outlined above lead to a widened focus and the inclusion of fully automated vehicles within the scope of the research. This was done to account for imaginaries of future developments potentially impacting and shaping perceptions of earlier stages.

Based on a support study, which provided an overview of the state of the sociological literature on automated driving and represented a summary of a total of 25 international studies of varying quality and breadth, the questions raised therein were analysed regarding partially automated driving (SAE Level 3) to develop a quantitative questionnaire. In order to further address the research gaps identified in this way (e.g. a lack of focus on partially automated driving in favour of anticipated expectations of fully automated vehicles; a neglect of the perspectives of other road users and the anticipation of further societal consequences caused by ADS), both well researched and novel dimensions were operationalized towards wide imaginations associated with automated

---

[77] „Vertrauenswürdigkeit und Zertifizierung in der Digitalisierung am Beispiel von Systemen zum assistierten und autonomen Fahren", eng.: „Trustworthiness and certification in digitalisation using the example of systems for assisted and autonomous driving". Due to the extent of the questionnaire, consisting of a total of 102 items and including other independent variables (e.g., possession of a driver's license, perceptions of road safety, experience with accidents, preferred mobility modes, "driving pleasure") as well as proxy questions on trustworthiness (such as trust in government institutions or manufacturing companies), only selected correlations addressing the specific research questions for this contribution can be discussed here. More comprehensive evaluations, the analysis of additional significant dimensions affecting "trust" and the complete research report of the project are available at: https://www.rechtundit.at/projekte/.

driving to allow the drawing of a more comprehensive picture of the sociological criteria of the trustworthiness of (partially) automated vehicles within the framework of the empirical survey presented here.

2.1 Dimensions

Demographic variables were included as previous research consistently suggested correlations between and personal attitudes towards the automation of driving functions[78]. An assessment of participants' **driving behaviour** (Nees, 2016) aimed to record personal automotive experiences in road traffic (driving licence possession, frequency of driving), the assumption of roles other than that of "driver" (e.g. cyclist, co-pilot) and basic confidence/well-being in road traffic. Under the assumption that a generally technology-savvy positioning also has an influence on the attitude of trusting ADS, an **affinity for technology** index was used to group participants into more technology-savvy and more technology-averse persons. Topics surrounding **automated driving** (inspired by (Kyriakidis, Happee and de Winter, 2015; Bansal and Kockelman, 2018) are above all characterised by the different levels of automation. Under the assumption that many aspects associated with automated driving are often (wrongly) negotiated under the term "autonomous driving", but nevertheless have a powerful impact on the expectations and fears generally placed on automated driving functions, this section was comprised of a survey of attitudes towards the automation of driving tasks that are not specific to a certain level of automation. To deal with the specific restrictions and possibilities of the SAE Level 3, a more detailed explanation of the term was followed by questions that surveyed attitudes towards the **partial automation of driving tasks**. In this way, the characteristic role definition of the driver as a "fallback ready user" and the associated constant readiness to take over the steering wheel again when requested to do so by the vehicle was considered. Finally, and based on the assumption that attitudes towards **fully automated vehicles** already affect the negotiation of trustworthiness of lower levels of automation, a final cluster aimed at surveying expectations towards what is often called "autonomous driving" and the imaginaries that accompany it.

---

[78] All demographic variables were mandatory, based on self-identification within predefined categories and inspired by the Eurobarometer surveys to allow comparison (e.g. European Commission, 2020, additional/diverging categories are highlighted): age (15-24, 25-39, 40-54 and 55 or above years old), gender (female, male, *diverse/other*), education (*highest degree, 6 options*) and place of residence/city size *(< 5.000, 5001 – 10.000, 10.001 – 50.000, > 50.000 residents)*.

2.2 Implementation

The research design was implemented as a preliminary quantitative online questionnaire study to explore the allocations and occurrences of ADS imaginaries that manifest as assemblages of expectations and concerns. Restrictions for sampling resulted from the consideration that only people who had already heard of or dealt with ADS (and therefore have developed imaginaries around them) could be considered for the research.

The dissemination of the questionnaires in the first phase ("experts") was carried out via the monthly newsletters of two cooperation partners, "AustriaTech" and "Verkehrsclub Österreich" (VCÖ), resulting in 144 datasets after filtering. Participants from this group were assumed to show a certain knowledge of and affinity for topics around mobility and their social relevance, however, their designation as "experts" must be regarded as a rough simplification for matters of practicality.

As a control group and for comparison with these "experts", "students" of the University of Graz were contacted via E-Mail using the university's "student.survey" service, resulting in 115 participants after filtering. With the insight gained from other studies that education is correlated with knowledge about ADS (Acheampong and Cugurullo, 2019), this group was identified as likely to be aware of developments in driving automation but without having expert knowledge about it and hence qualified as a comparative counterpart to the "experts". Response rates for both dissemination phases cannot be evaluated due to unclear accounts given from the research partners, yet must generally be considered quite low in view of around 700 self-reported subscribers to the mailing list from "AustriaTech", "a few thousand" to the newsletter of VCÖ and several thousand subscribed "students".

Due to the restrictions mentioned above, the VERDI survey does not claim to represent the Austrian population or any of its specific subpopulations, but rather serves primarily as an exploratory attempt to investigate additional dimensions affecting "trust" and to gain insights into the structure of contemporary imaginaries surrounding ADS.

3 Results

3.1 Descriptive analysis – independent variables

The restrictions in sampling manifested in the distribution of demographic variables in both chosen subpopulations, drawing a clear yet polarized picture between them: Experts were predominantly male (73.9%), had a university degree (63.9%) and were older than 55 years (59.6%) whereas students were predominantly female (60.9%), graduated from school (59.6%) or university (38.6%) and were between 15 and 24 years old (55.7%). Most participants in both groups lived in cities with more than 50,000 inhabitants (57.6% of experts, 49.1% of students). Since only 0.7% of respondents self-identified as outside or beyond a binary understanding of gender (category "divers/other"), this category was not considered in the gender-specific evaluations.

ID		strongly agree	agree	disagree	strongly disagree
TA1	I love owning new technological devices.	20,0%	34,9%	30,6%	14,5%
TA2	Technology is fascinating to me.	38,2%	37,0%	18,9%	5,9%
TA3	It is easy for me to learn how to operate a new technical device.	36,5%	38,0%	20,0%	5,5%
TA4	I prefer to do things the way I'm used to doing them instead of using new technologies.	11,5%	33,7%	41,7%	13,1%
TA5	There are tasks in my life that have been made easier by computers doing the work for me.	36,4%	41,2%	15,6%	6,8%
TA6	New technologies make things more cumbersome.	5,1%	20,6%	51,0%	23,3%
TA7	I use technologies such as digital voice assistants, smart watches, or smart home devices.	12,7%	13,1%	19,0%	55,2%

Table 1: Items of Index "technology affinity" and corresponding responses

84.3% of the respondents were in possession of a driving licence, of which 59.6% had held it for more than 10 years. 82.2% said they generally felt safe in road traffic (38.8% "strongly agree", 43.9% "agree"). On the other hand, only 46.5% felt that road traffic generally was becoming safer (n=245, 9.4% "strongly agree", 37.1% "agree"). 64.6% said they liked driving (37% " strongly agree", 27.3% "agree"), yet only 8% admitted to sometimes driving just for fun and without a destination. Regarding the everyday mobility modes, respondents showed a strong preference for bicycles / e-bikes or public transport, with cars only in third place in terms of daily or weekly mobility modes. None of these categories showed significant differences regarding the different samples (experts, students).

Seven items were used to operationalise the dimension "technology affinity" (Cronbach's alpha = .841) to assess general attitudes towards technological progress (see **Table 1**)[79].These items were first translated into a mean value index, which was further translated into a dichotomous index (1 = tech-savvy, 2 = tech-averse) using 2.5 (middle value of categories) as separator value, thus dividing the sample into 63.9% generally technology-savvy and 36.1% generally technology-averse participants.

No differences in the demographic distribution of the two groups in terms of age and level of education were recorded, nor was an urban-rural divide evident in the data. Only the category "gender" showed significant influence on the affinity for technology (T(159)=2.114, p<.05), whereby men tended to be more tech-savvy than women.

3.2 Descriptive analysis - dependent variables

98.7% of respondents were aware of "automated driving", 80.2% stated that they had already heard of accidents with such vehicles. 94.6% had already heard of fully automated or "autonomous" driving. The evaluation of specific driving situations showed that automated driving functions would be particularly popular for monotonous journeys ("strongly agree" or "agree": 81.8%%) and when tired ("strongly agree" or "agree": 70.4%). This rather positive and seemingly trusting attitude is partly compromised when including passengers in the imaginations: 49.7% would rather drive themselves than use automated driving functions with passengers in the car. A large proportion of respondents (68.6%) think that automated driving will help improve road safety.

---

[79] The scale for measuring "technology affinity" presented here was inspired by Karrer-Gauß *et al.* (2009, items TA1, TA3 & TA6), Nees (2016, TA2, TA4 & TA5) and aimed at representing attitudes that capture affinity/excitement of technologies. TA7 was inspired by Reig *et al.* (2018) to further include experiences with (at the time) novel technologies. The omission of items from the original constructs resulted from the necessary shortening of the questionnaire. Adjustments were based on the criteria of accuracy (e.g., cost factors were not relevant in this context) and on pretests. Both pretests and the high internal validity of the scale confirmed minimal trade-offs between accuracy and item exclusion for questionnaire economy.

Expectations towards automated driving
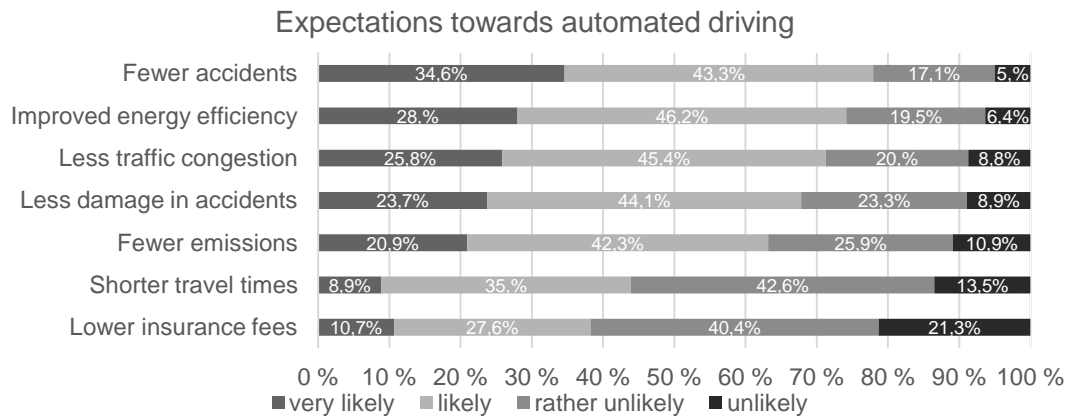
Figure 1: Expectations towards automated driving

Regarding the general expectations for the introduction of ADS in road transport, respondents indicate that they particularly expect fewer accidents (77.9% very likely or likely) and better energy efficiency (74.2%) of ADS (see **Fig. 1**). Regarding their reservations and fears, it is evident that the effects of device or system errors on road safety (72.4% very concerned or concerned), safety from computer hackers (72.1%) and the legal liability of drivers (71.7%) are perceived as particularly worrisome, while factors such as learning to use them causing very little concern (see **Fig. 2**). Of particular interest in this context is that only a small proportion of respondents are concerned about ADS not being able to drive as safely as human drivers, while at the same time expressing concerns about reliability and the impact of system failures: a seemingly contradictory relationship that will be discussed later.

Concerns about automated driving
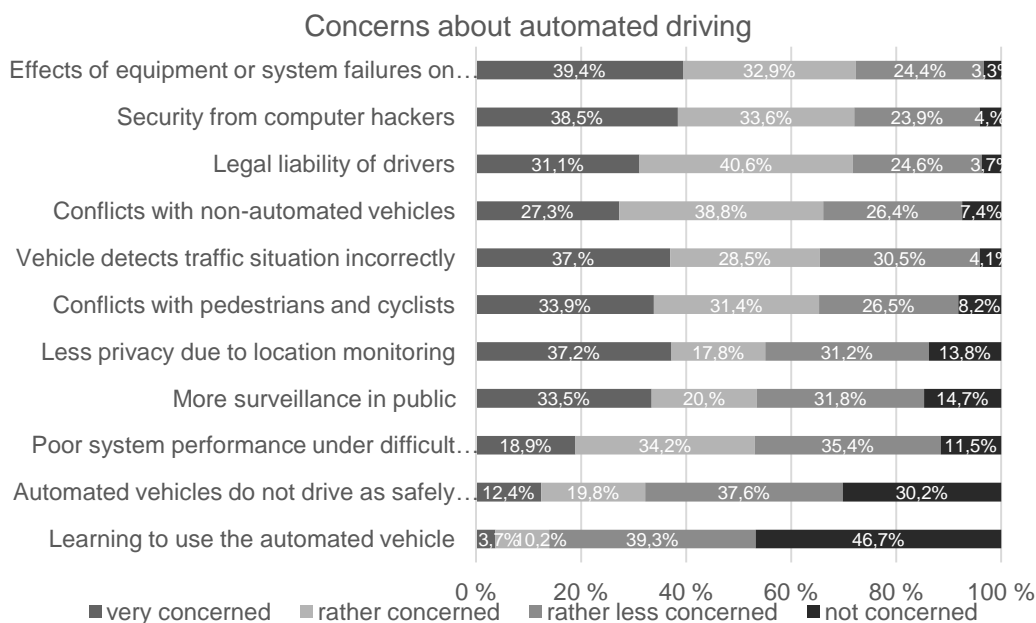
Figure 2: Concerns about problems associated with automated driving.

3.3 Analysis of selected interrelationships

3.3.1 Demographics

Men are less concerned than women about the idea of fully automated vehicles on the road (T(217)=-5.023, p<.001), are more likely than women to say that they would trust fully automated vehicles to get them to their destination safely (T(215)= 3.355, p<.001) or to transport friends and family (T(211)=3.661, p<.001) and think that they would help to improve road safety (T(213)=2.973, p<.01). The items summarised under "autonomy" around the willingness to relinquish control of the vehicle are also closely related to gender: women are generally more sceptical about conveying driving tasks to an automation (T(239)=3.141, p<.01), express a stronger need to be able to take control at any time (T(236)=-2.537, p<.01) and think that it is less likely that automated driving will contribute to an improvement in road safety (T(233)=2.102, p<.05).

With the exception of being more convinced than women that fully automated vehicles pose a threat to existing jobs (T(208)= -3.336, p<.001), men consistently express more optimistic expectations towards ADS and the benefits associated with them, while simultaneously being less concerned about any of their potential dangers than women.

The age of the respondents manifested only regarding increased positive expectations by younger participants towards fully automated cars enabling environmentally friendly mobility (r=.153, p<.05). This finding contradicts other studies that show that higher ages correlate with an increase in concerns towards driving automation, yet is likely to stem from the "experts" sample consisting of older but more technology-savvy participants compared to the total population.

3.3.2 Technology affinity

All positive attitudes towards fully automated driving correlate with having and affinity for technology in the sense that technology-savvy people are more likely to say they will trust fully automated vehicles in general (T(219)=-6.205, p<.001), will trust them to transport themselves and their family safely (T(215)=-5.576, p<.001), to make road traffic safer (T(217)=-6.193, p<.001) and to improve mobility in general (T(221)=-7.035, p<.001).
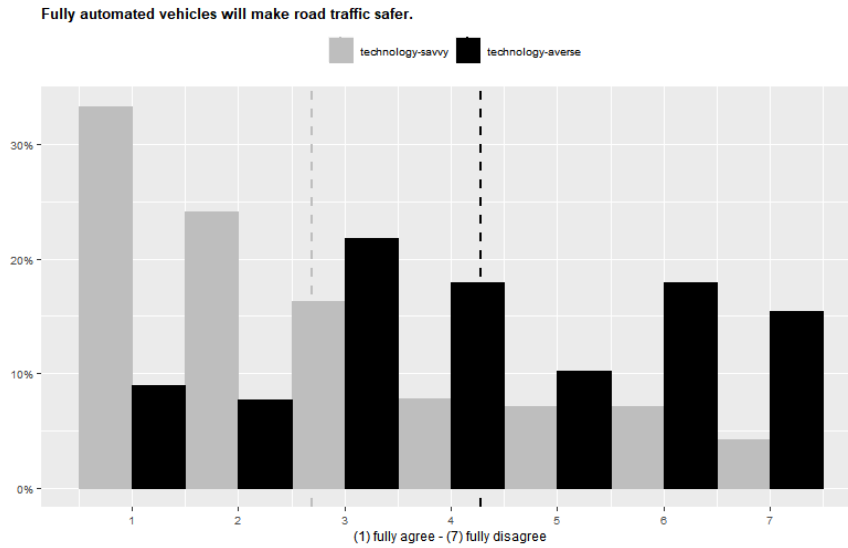
Figure 3: Distribution of item "fully automated vehicles will make road traffic safer" grouped by "technology affinity".

Positive expectations regarding the safety aspects of automated mobility are particularly strongly associated with a technology-savvy attitude (differences in anticipating "fewer accidents": $T(238)=-6.261$, $p<.001$ and "less damage in accidents": $T(234)=-5.602$, $p<.001$). This optimism is most clearly expressed in the agreement with the statement that automated driving contributes to improving road safety ($T(237)=-7.112$ $p<.001$). Those with an affinity for technology also tend to see more positive aspects regarding safety for all other road users (e.g.: "Do you think road safety will increase for children and other risk groups?": $T(214)=-4.21$, $p<.001$). This group is more willing to hand over control to an automated vehicle ($T(243)=-5.906$, $p<.001$), trusts more that they would be transported safely by an automated vehicle ($T(242)=-7.050$, $p<.001$) and expresses less need to always have the option to take control ($T(240)=3.069$, $p<.01$).

In terms of positive expectations, the data thus reflect a clear separation between the technology-savvy and -averse groups, which manifests in consistent and significant differences in mean value with respective large effect sizes and shows a fundamentally more optimistic expectation from technology-savvy participants towards the automation of driving tasks. However, a slightly different pattern emerges when considering the negative expectations and concerns about ADS, where these differences persist, but to a much lesser extent. This is especially relevant for items that include the "human factor" in the consideration of ADS's effects. While technology-savvy participants are still less concerned with legal liability in the case of accidents ($T(242)=3.538$, $p<.001$), the effect size as measured by Cohen's d is reduced to $d=.474$, while the differences between the two groups lose significance in the items "fully automated vehicles are a threat to existing jobs" ($T(212)=.775$, $p=.439$, $d=.111$) and concerns over "conflicts with pedestrians and cyclists" ($T(240)=.624$, $p=.532$, $d=.083$).

4 Discussion

As previous studies have shown, demographic variables exert a relevant influence on attitudes towards automated mobility (Bansal and Kockelman, 2018; European Commission, 2020; Hulse, Xie and Galea, 2018; Schoettle and Sivak, 2014). This is also the case in the research presented here, whereby decisive correlations could be found, especially between the age and gender of the respondents. Older respondents and women are generally more sceptical about handing over driving tasks to automation and are more sceptical about the expected improvements of automated mobility. However, due to the strong homogeneity of the sample examined regarding the proportion of participants with a high level of formal education, further influences can be assumed, as they have been found in representative cross-country evaluations (European Commission, 2020).

More influential than sociodemographic variables, however, was participants affinity for technology, which plays a central role in shaping expectations towards positive changes regarding more ecological and more inclusive transport systems through automation. Despite displaying generally positive attitudes and expectations towards automated driving technologies, technology-savvy participants also express high (though comparatively lower) levels of concern towards safety, privacy, and security. Technology-savvy participants consistently share a more optimistic assessment of automated mobility while at the same time are more indifferent to associated threats and more likely to expect extensive benefits in road traffic for all participating road users through the automation of driving tasks (less traffic congestion, shorter driving times, fewer emissions, etc.).

The safety-relevant aspects of automated driving reveal an ambivalent picture among the respondents: although the improvement of road safety is one of the most important expectations of automated mobility, which is expressed by the prospect of fewer accidents and less damage in accidents. At the same time, however, strong fears are expressed about new threats, such as those anticipated from hacker attacks, the effects of device and system errors or data security problems. This tendency also continues regarding other road users and the assumption of other roles in road traffic: although only a few believe that the introduction of automated vehicles will worsen the safety of various road users, two thirds of the respondents are concerned or very concerned about potential conflicts between automated vehicles and pedestrians or cyclists in traffic.

With a specific focus on partially automated driving, it becomes apparent that although just under half of the respondents would take their hands off the steering wheel under the given legal conditions, only just under a quarter would carry out secondary activities such as reading. The possibility of being able to intervene in the driving process at any

time and the certainty that sufficient time and information would be available to safely take over the driving task are the most frequently cited factors that influence trust in partially automated vehicles. In contrast, the most frequently mentioned fear of partially automated driving is the reduction of the driver's attention and the resulting artificial feeling of safety.

These findings, where imaginaries of automated vehicles on the one hand are being perceived not only as safe, but as *safer* than human drivers who – due to their physical and mental limitations, inattention, distractions, or skill level – pose an inherent and obvious risk to road traffic and on the other hand also contain an anticipated moment of danger, which is expressed by the desire to influence the driving process at any time, feeding into what Beer (2023) refers to as a dimension of "tensions in algorithmic thinking": the notion of the simultaneous in- and exclusion of the human in algorithmic systems. These "tensions" arise around the competing forces between seeking "[technological] advancement by limiting the human as much as possible" or, in our case, automating "other" drivers that are being perceived to pose risks in road traffic, while simultaneously aspiring "acts of reinsertion [that] seek to limit human erasure and [that] re-establish the value of the human and human decision making" (Beer, 2023, p. 8) as an unwillingness to give up one's own oversight and control over automation. This "meshing of human and machine agency" that is being imagined using the example of automated vehicles therefore also reflects the "defining and competing forces" in the ongoing process of automation, where "different features and approaches pull in different directions, creating tensions in the process" (Beer, 2023, p. 7). Central to these contradicting forces are the sentiments related to them, as expressed by the dream of an algorithmically established "posthuman security" that guarantees safety by eradicating human error and the simultaneous perception of an automation "overstepping" its algorithmic autonomy, therefore revealing the "limits of what is possible or what are considered to be the acceptable extents of automation" (Beer, 2023, p. 42). Central to both aspects, despite their disparate directions, is that they both foster a sense of legitimacy for further automation, either by overcoming the fallible "human factor" or by avoiding the "overstepping" of perceived limits and undesirable independence of an automated agent. This serves as an explanation as to why specifically technology-savvy respondents were often found to embody these tensions in their answers.

5 Conclusions

Using common imaginaries of automated vehicles' anticipated affordances, trust in ADS was operationalized by the expectations and fears associated with them, involving perspectives not only from drivers, but from all people potentially affected by them. The importance of this broader societal perspective in the formation of trust towards new technologies is especially relevant when considering its widespread disruptive effects at all ends of the imaginative spectrum, that go far beyond its immediate impact on road traffic and its users: the shift in workforce (skilled instead of unskilled labour) and the disruption of labour markets, settlement patterns and urban land use, car ownership structures and effects on ecosystems through emissions and pollution.

Next to replicating common demographic splits in opinions within our study, "technology affinity" was found a key explanatory factor structuring the anticipated affordances of ADS in the context of our research. However, a closer examination reveals that these anticipations are not without contradictions. Drawing from the idea of "tensions in algorithmic thinking", we see our findings embedded into a wider process of automatization and the sprawling "will to automate" (Beer, 2023, p. 128).

However, as a preliminary study with a relatively small sample size of very specific populations aimed to explore tentative trends within distributions of imaginaries, we do not claim the study to be representative. Rather, we would encourage further exploration of the role of "technology-affinity" and its social stratification, especially regarding the temporal and spatial aspects of its formation as well as further analysis of how the "imagination phase" and the appropriation of particular imaginaries structure the "domestication" of future innovations. Through this, the differences in age, gender, and education and the respective distribution of "technology-affinity" that emerge from the data should not only sensitise us to questions of how and among whom powerful ideas about "innovative" technologies resonate socially and how they reflect the underlying ideals in the development process, but also invite us to ask who ultimately benefits from them, what imaginations of broader societal transformations are associated with individual expectations, and ultimately who is being left out of this process. We therefore recommend investigating the immanent "tensions" of algorithmic imaginaries as a theoretical lens through which seemingly contradictory and competing forces in expectations and concerns towards automated vehicles can be integrated, not only through a comprehensive concept of algorithmic thinking, but also within a wider societal process of automatization, which entails new challenges in the negotiation and attribution of agency between human and artificial agents.

Disclosure

References

Acheampong, R.A. and Cugurullo, F. (2019) 'Capturing the behavioural determinants behind the adoption of autonomous vehicles: Conceptual frameworks and measurement models to predict public transport, sharing and ownership trends of self-driving cars', Transportation Research Part F: Traffic Psychology and Behaviour, 62, pp. 349–375. Available at: https://doi.org/10.1016/j.trf.2019.01.009.

Bansal, P. and Kockelman, K.M. (2018) 'Are we ready to embrace connected and self-driving vehicles? A case study of Texans', Transportation, 45(2), pp. 641–675. Available at: https://doi.org/10.1007/s11116-016-9745-z.

Beer, D. (2023) The tensions of algorithmic thinking: automation, intelligence and the politics of knowing. Bristol: Bristol University Press.

Bensaude-Vincent, B. (2014) 'The politics of buzzwords at the interface of technoscience, market and society: The case of "public engagement in science"', Public Understanding of Science, 23(3), pp. 238–253. Available at: https://doi.org/10.1177/0963662513515371.

Bucher, T. (2017) 'The algorithmic imaginary: exploring the ordinary affects of Facebook algorithms', Information, Communication & Society, 20(1), pp. 30–44. Available at: https://doi.org/10.1080/1369118X.2016.1154086.

Davis, J. (2020) 'How Artifacts Afford: The Power and Politics of Everyday Things'. Available at: https://doi.org/10.7551/mitpress/11967.001.0001.

Deb, S. et al. (2017) 'Development and validation of a questionnaire to assess pedestrian receptivity toward fully autonomous vehicles', Transportation Research Part C: Emerging Technologies, 84, pp. 178–195. Available at: https://doi.org/10.1016/j.trc.2017.08.029.

European Commission (2020) 'Eurobarometer 92.1: Expectations and concerns of connected and automated driving'. GESIS Data Archive. Available at: https://doi.org/10.4232/1.13541.

European Commission (2023) Road Safety Thematic Report – Consequences of crashes. European Road Safety Observatory. Brussels: European Commission, Directorate General for Transport.

European Commission And European Parliament (2018) 'Eurobarometer 82.4: Autonomous Systems, Gender Equality, and Smoking Habits'. GESIS Data Archive. Available at: https://doi.org/10.4232/1.13044.

Fussey, P. and Roth, S. (2020) 'Digitizing Sociology: Continuity and Change in the Internet Era', Sociology, 54(4), pp. 659–674. Available at: https://doi.org/10.1177/0038038520918562.

Hancock, P.A. (2019) 'Some pitfalls in the promises of automated and autonomous vehicles', Ergonomics, 62(4), pp. 479–495. Available at: https://doi.org/10.1080/00140139.2018.1498136.

Heinrichs, D. (2016) 'Autonomous Driving and Urban Land Use', in M. Maurer et al. (eds) Autonomous Driving: Technical, Legal and Social Aspects. Berlin, Heidelberg: Springer, pp. 213–231. Available at: https://doi.org/10.1007/978-3-662-48847-8_11.

Hirsch, E. and Silverstone, R. (2003) 'Information and communication technologies and the moral economy of the household', in Consuming technologies. Routledge, pp. 25–40.

Hoff, K.A. and Bashir, M. (2015) 'Trust in Automation: Integrating Empirical Evidence on Factors That Influence Trust', Human Factors, 57(3), pp. 407–434. Available at: https://doi.org/10.1177/0018720814547570.

Hulse, L.M., Xie, H. and Galea, E.R. (2018) 'Perceptions of autonomous vehicles: Relationships with road users, risk, gender and age', Safety Science, 102, pp. 1–13. Available at: https://doi.org/10.1016/j.ssci.2017.10.001.

Jayaraman, S.K. et al. (2018) 'Trust in AV: An Uncertainty Reduction Model of AV-Pedestrian Interactions', in Companion of the 2018 ACM/IEEE International Conference on Human-Robot Interaction. New York, NY, USA: Association for Computing Machinery (HRI '18), pp. 133–134. Available at: https://doi.org/10.1145/3173386.3177073.

Jayaraman, S.K. et al. (2019) 'Pedestrian Trust in Automated Vehicles: Role of Traffic Signal and AV Driving Behavior', Frontiers in Robotics and AI, 6. Available at: https://www.frontiersin.org/articles/10.3389/frobt.2019.00117 (Accessed: 22 March 2023).

Johannessen, L.E. (2023) 'Anticipated affordances: Understanding early reactions to new technologies', New Media & Society, p. 14614448231161512. Available at: https://doi.org/10.1177/14614448231161512.

Just, N. and Latzer, M. (2017) 'Governance by algorithms: reality construction by algorithmic selection on the Internet', Media, Culture & Society, 39(2), pp. 238–258. Available at: https://doi.org/10.1177/0163443716643157.

Karrer-Gauß, K. et al. (2009) 'Technikaffinität erfassen – der Fragebogen TA-EG', ZMMS Spektrum, 29.

Kaur, K. and Rampersad, G. (2018) 'Trust in driverless cars: Investigating key factors influencing the adoption of driverless cars', Journal of Engineering and Technology Management, 48, pp. 87–96. Available at: https://doi.org/10.1016/j.jengtecman.2018.04.006.

Kyriakidis, M., Happee, R. and de Winter, J.C.F. (2015) 'Public opinion on automated driving: Results of an international questionnaire among 5000 respondents', Transportation Research Part F: Traffic Psychology and Behaviour, 32, pp. 127–140. Available at: https://doi.org/10.1016/j.trf.2015.04.014.

Lee, J.D. and See, K.A. (2004) 'Trust in Automation: Designing for Appropriate Reliance', Human Factors, 46(1), pp. 50–80. Available at: https://doi.org/10.1518/hfes.46.1.50_30392.

Lewis, J.D. and Weigert, A. (1985) 'Trust as a Social Reality', Social Forces, 63(4), pp. 967–985. Available at: https://doi.org/10.1093/sf/63.4.967.

Luhmann, N. (2017) Trust and power. English edition. Malden, MA: Polity.

McKinsey (2023) The future of autonomous vehicles (AV). Available at: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/autonomous-drivings-future-convenient-and-connected (Accessed: 27 March 2023).

Mourad, A., Puchinger, J. and Chu, C. (2019) 'Owning or sharing autonomous vehicles: comparing different ownership and usage scenarios', European Transport Research Review, 11(1), p. 31. Available at: https://doi.org/10.1186/s12544-019-0370-8.

Nees, M. (2016) 'Acceptance of Self-driving Cars: An Examination of Idealized versus Realistic Portrayals with a Self- driving Car Acceptance Scale', Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 60, pp. 1449–1453. Available at: https://doi.org/10.1177/1541931213601332.

Nikitas, A., Vitel, A.-E. and Cotet, C. (2021) 'Autonomous vehicles and employment: An urban futures revolution or catastrophe?', Cities, 114, p. 103203. Available at: https://doi.org/10.1016/j.cities.2021.103203.

Raats, K., Fors, V. and Pink, S. (2020) 'Trusting autonomous vehicles: An interdisciplinary approach', Transportation Research Interdisciplinary Perspectives, 7, p. 100201. Available at: https://doi.org/10.1016/j.trip.2020.100201.

Rammert, W. (2003) Technik in Aktion: verteiltes Handeln in soziotechnischen Konstellationen. Berlin: Technische Universität Berlin, Fak. VI Planen, Bauen, Umwelt, Institut für Soziologie Fachgebiet Techniksoziologie (TUTS - Working Papers).

Regan, M. et al. (2017) Preliminary findings from the first Australian National Survey of Public Opinion about Automated and Driverless Vehicles. Available at: https://doi.org/10.13140/RG.2.2.11446.80967.

Reig, S. et al. (2018) 'A Field Study of Pedestrians and Autonomous Vehicles', in Proceedings of the 10th International Conference on Automotive User Interfaces and Interactive Vehicular Applications. New York, NY, USA: Association for Computing Machinery (AutomotiveUI '18), pp. 198–209. Available at: https://doi.org/10.1145/3239060.3239064.

SAE International (2021) SAE Levels of Driving AutomationTM Refined for Clarity and International Audience. Available at: https://www.sae.org/site/blog/sae-j3016-update (Accessed: 30 May 2023).

Saleh, K., Hossny, M. and Nahavandi, S. (2017) 'Towards trusted autonomous vehicles from vulnerable road users perspective', in 2017 Annual IEEE International Systems Conference (SysCon). 2017 Annual IEEE International Systems Conference (SysCon), pp. 1–7. Available at: https://doi.org/10.1109/SYSCON.2017.7934782.

Schmidt, H. et al. (2019) 'Hacking Nonverbal Communication Between Pedestrians and Vehicles in Virtual Reality'. arXiv. Available at: http://arxiv.org/abs/1904.01931 (Accessed: 22 March 2023).

Schoettle, B. and Sivak, M. (2014) A survey of public opinion about autonomous and self-driving vehicles in the U.S., the U.K., and Australia. Technical Report. University of Michigan, Ann Arbor, Transportation Research Institute. Available at: http://deepblue.lib.umich.edu/handle/2027.42/108384 (Accessed: 2 April 2023).

Silva, Ó. et al. (2022) 'Environmental impacts of autonomous vehicles: A review of the scientific literature', Science of The Total Environment, 830, p. 154615. Available at: https://doi.org/10.1016/j.scitotenv.2022.154615.

Silverstone, R. (1994) Television and everyday life. London ; New York: Routledge.

Taddeo, M. (2017) 'Trusting Digital Technologies Correctly', Minds and Machines, 27(4), pp. 565–568. Available at: https://doi.org/10.1007/s11023-017-9450-5.

The Dawn Project (2022) 'Critical safety issues revealed by The Dawn Project's testing of Tesla Full Self-Driving', The Dawn Project. Available at: https://dawnproject.com/critical-safety-issues-revealed-by-the-dawn-projects-testing-of-tesla-full-self-driving/ (Accessed: 27 March 2023).

Winter, S., Chudoba, K. and Gutek, B. (1998) 'Attitudes toward computers: When do they predict computer use?', Information & Management, 34, pp. 275–284. Available at: https://doi.org/10.1016/S0378-7206(98)00065-2.

Yerdon, V. et al. (2016) Investigating Cross-Cultural Differences in Trust Levels of Automotive Automation, p. 194. Available at: https://doi.org/10.1007/978-3-319-41636-6_15.

Zenkl, T. and Griesbacher, M. (2020) 'Trust in Automated Vehicles from a Sociological Perspective', Jusletter-IT, (27-Mai-2020). Available at: https://doi.org/10.38023/962185e1-c563-4193-a56a-c73280c86461.

Thematic Field F:

Sustainable Food Systems

From the edge to the core: Participatory food environment research in European cities

Alexandra Czeglédi[1], Ewa Kopczynska[2], Taru Peltola[3], Tuija Seppälä[3], Vanda Pózner[1], Diana Szakál[1], David Steinwender[4], Sandra Karner[4], Minna Kaljonen[3], Iikka Oinonen[3], Maya Hey[5]

[1] Environmental Social Science Research Group (ESSRG), Budapest, Hungary

[2] Jagiellonian University in Krakow, Poland

[3] Finnish Environment Institute (SYKE), Helsinki, Finland

[4] Interdisciplinary Research Center for Technology, Work and Culture (IFZ) Graz, Austria

[5] University of Helsinki, Finland

Abstract. On the concept of participatory food environment research in European cities, this paper provides a critical overview of current four research processes presented at the STS Graz conference. By adopting an interpretative perspective on the food environment definition and research methodologies in the food research field, this article is looking beyond the purely material and market-based framing of food environment. Rather, we argue, local food environment should be examined from a combined, material, normative and emotional perspectives. Alternative and informal practices such as subsistence farming and gardening, food exchange, food sharing and other forms of food circulation outside the market should be included in a critical research agenda. We have found it essential to include critical and participatory research projects that put the experiences of marginalised groups and communities at the centre of the debate: how to conduct socially just and meaningful research on food environments? How to make the research process inclusive? And how to apply the photo-voice methodology in marginalised settings? Four presentations of the session explored specific food environments and community experiences in different European cities from Austria, Finland, Hungary and Poland. The first part of this paper briefly introduces the theoretical and methodological approach to food environment and the four cases unfolding in localised settings. The second part reflects discussions from the interactive session of the conference session on how (1) to design inclusive research processes and (2) what ways photo-voice methodologies can be adopted in the context of food environment research.

1 Introduction

The thematic call for research on sustainable food systems at the 21st STS Conference in Graz provided an opportunity to focus on specific aspects of the food system, in particular approaches to improve the situation of marginalised communities and individuals. The session 'From the edge to the core: Participatory food environment research in European cities' was organised with the aim of bringing knowledge co-production in the centre of the academic discussion. Previously, the Plan'Eat EU Horizon 2020 project[80] had provided platform for shaping a common critical view on the food environment across EU countries. This endeavour was continued at the conference with the aim of bringing the session participants closer to a common understanding of food environments, inclusive research processes and methodological challenges across Europe. We have found it essential to include critical and participatory research projects that put the experiences of marginalised groups and communities at the centre of the debate: how to conduct socially just and meaningful research on food environments? How to make the research process inclusive? And how to apply the photo-voice methodology in marginalised settings?

Four cases of the session explored specific food environments and community experiences from different European cities: low-income households in Graz (Austria), rural and urban regions of Finland, single parents in the district VIII of Budapest (Hungary) and the case of low-income adults in Krakow (Poland). The presentations were followed by interactive discussions on participatory research, focusing on the experiences of marginalised, less visible consumer groups in food environment research. The first part of this paper briefly introduces the theoretical and methodological approach to food environment and the four cases unfolding in localised settings. The second part reflects discussions from the interactive session of the conference session on how (1) to design inclusive research processes and (2) what ways photo-voice methodologies can be adopted in the context of food environment research.

2 What does food environment(s) mean?

The concept of the food environment is relatively new and is still being conceptualised, therefore there are several different definitions. Turner et al. (2018) attempted to reconcile competing definitions of the food environment, building on the FAO (2016) report, which is rooted in socio-ecological theory. Initial concepts focused on the external

---

[80] Plan'Eat EU Horizon 2020 project: https://planeat-project.eu/ (accessed at 01.06. 2023.)

dimensions of the environment, such as shops and surroundings. Later descriptions have tried to include the internal dimensions of consumers, social relationships and the shared aspects of the food environment within and between households. This involves zooming in on emotional and bodily experiences, as well as social norms, collective identities, traditions and political ideologies that play a significant role in how people represent and perceive their food environment.

Turner et al. (2018) observed that what these definitions have in common is a conceptualization of the food environment as the physical locations within which food is provided, the set of market-based opportunities and constraints that influence people's food provisioning and consumption decisions. However, food provisioning cannot be reduced to formal market-based transactions, such as self-sustaining farming and gardening, informal food exchange, food sharing and other forms of food circulation outside the market, which should be recognised as part of the food environment.

The concept of the food environment has recently come to the fore at the EU policy level. It was first coined by the High Level Panel of Experts on Food Security and Nutrition (2017). Than the broadly defined concept was adopted in the Farm to Fork strategy (2020, p. 5) as *'the physical, economic, political and socio-cultural environment in which consumers interact with the food system to make choices about the purchase, preparation and consumption of food and food products'*.

This definition implies an interdisciplinary approach to food environment studies, but it does little to capture the complexity and diversity of social practices and food cultures. It reflects a market-based view of food environment research and limits the scope of the concept to commercial transactions. To contribute to food environment research from a critical vantage point, traditional and policy research needs to be broadened by encompassing informal practices within communities and household.

General definitions and research guidelines show that the food environment is complex, diverse and rapidly changing, especially in urbanised regions. This variability necessitates more locally embedded research to understand the characteristics of the food environment and the views and experiences of different consumer groups regarding their own food environment. In each case, different practices and dimensions are gaining importance and shaping the local food environment.

The food environment is primarily material, however, as session organisers and participants, we proposed to look at the local food environment from a combination of material, normative and emotional perspectives. Consumers' everyday experiences of the food environment unfold in multiple places and situations: at home, through media exposure, while eating and shopping, in the organisation and management of the daily logistics of food supply, and at family and cultural gatherings and social events.

Critical thinking further needs to be mobilised to integrate marginalised experiences and often overlooked knowledge from the socio-economic peripheries of European cities. In other words, to map food environments with those whose experiences are often left out of the generic category of 'people', as put in the Farm to Fork strategy, policy papers and marketing strategies.

In order to better identify what interventions are most needed to promote socio-nutritional change, support sustainable practices and better disseminate healthy food in local and specific food environments, we believed that it is essential in critical interdisciplinary research to place the experiences of marginalised groups and communities at the centre of our discussions. By better understanding, the everyday experiences of consumers through participatory research processes, food scientists, nutritionists, environmentalists, health professionals, sustainability actors and policy-makers can be better informed about the diversity of challenges and needs in different food environments.

3 Co-researching the food environment

Turner et al. (2018, p. 95) have suggested more specifically how to start researching the food system. Researching the interactions between both external domains (availability, prices, vendors, products, marketing, regulation) and internal, personal domains (accessibility, affordability, convenience, desirability) is one way to explore the features of the local food environment.

Researchers have a range of creative approaches to engage consumers and collectively analyse their lived experiences. Individual interviews, group discussions, visual and spatial methods and diaries in food environment research (Neve et al. 2021) are just some of the directions that researchers can follow. Participatory methods such as photo-voice or smartphone-based citizen science offer visual, creative co-learning to engage consumers beyond and instead of traditional surveys and often intimidating interview settings.

All presentations of the session adopted a participatory approach to food environment research, combined with food sharing, communal cooking and taking photos of eating habits or environments. Out of the four presentation, three presentations applied photo-voice. Therefore, in the discussion part, the specificities of the photo-voice methodology is discussed in more detail.

4 Food environment research cross Europe

We received proposals that address challenges and solutions in the broader food environments co-researching with marginalised and disenfranchised groups such as low-income households in Graz (Austria), urban and rural youth in Finland, single parents in Budapest (Hungary), and adults with low-economic status receiving food donations in Krakow (Poland). Across these different cases, we initiated a horizontal overview of small-scale participatory research projects on food environments. All four research projects mobilised photo-voice and co-creative methodologies to better grasp views, norms, emotions, expectations, and material capabilities that are shaping participants' choices and habits within the food environment.

Case 1: Austria, Graz

Culture.Kitchen: Implementing healthy and sustainable food bottom-up in an intercultural setting

Authors: David Steinwender, Michaela Schneebacher, Sandra Karner

Culture.Kitchen is an innovative experiment run by Transition Graz[81] - together with two neighbourhood centres in Graz[82], having different social environments. One of these centres operates in the multicultural low-income neighbourhood "Triester Viertel" (formerly it was a worker's settlement), which is rather "isolated" (physically) and has a bad reputation as representing a societal hot spot within the city. The other centre is situated in a socio-economically more diverse neighbourhood, which does not have clearly defined boundaries due to its building structure.

In both neighbourhoods, several activities regarding food have been conducted before the introduction of the *Culture.Kitchen,* e. g. dealing with food sharing, food processing and the improvement of the food supply in the area. The project idea of C*ulture.Kitchen* is based on an examination of the food supply system in the Triester neighbourhood done by IFZ, which included recommendations that Transition Graz and the local neighbourhood centre have taken up in order to make sustainable food more accessible. The concept of *Culture.Kitchen* is also inspired by the "Kitchen for all", where food is cooked and served for a donation.[83]

In practice, on each date, someone cooks his or her favourite dish. Due to the multicultural orientation, these are usually different national dishes. Not only recipes but also the

---

[81] WhichTransition Graz (https://transitiongraz.org/) is inspired by the community action approach of the Transition Town Movement

[82] Neighbourhood work in Graz is a special form of neighbourhood-based social work.

[83] The focus is not charity, but social purpose.

personal stories of the cooks are discussed. This addresses the social inclusion aspect of the neighbourhood work.

Subsequently, it is planned to integrate questions of sustainable food procurement and health aspects into the Culture.Kitchen. These two aspects are to be addressed bottom-up, taking into account the living environments of the participants and starting from there. At the moment, after 4 cooking sessions, the aspect of social inclusion is still the main focus. In the process, different approaches to how health and sustainability aspects are planned to be incorporated as well are tested. In this respect, the project is a practical experiment that is to be further developed. Above all, the project still needs to gain experience regarding appropriate settings.

The coupling with concrete initiatives of the neighbourhood centres, such as a Food Coop and the development of a Food Hub are scenarios for the future.

Case 2: Finland, rural and urban regions

Everyday food environment of the Youth: Applying a photo-voice method in Finland

Authors: Tuija Seppälä, Minna Kaljonen, Taru Peltola, Iikka Oinonen

Youths' involvement in the transition to sustainable food systems is important for several reasons. First, youth is a special phase of life where one's personal food-related values are typically reflected on. Second, young people are often forerunners of changes in lifestyles, and they can have new ideas for sustainability. Third, young people are the best experts in their own food environment, but youth often experience that their perspectives are not adequately considered in decision-making.

We conducted a small-scale participatory research project utilizing a photo-voice method on the everyday food environment with young people in Finland. The study aimed at producing an understanding of the young people's experiences related to their everyday food environments as well as the suitability of the method in supporting young people's agency in the sustainability transition. The photo-voice method is intended to empower vulnerable groups to enhance their needs and perspectives in societal decision-making by utilizing documentary photography, critical group discussions and dissemination of the outcomes of these critical reflections.

We recruited four different groups of voluntary young people from urban and rural environments. The participants in the groups studied and photographed issues in their food environment that hindered or enabled them to act according to their values. The groups also collectively reflected upon their understandings and deliberated potential solutions to more sustainable food environments together with the researchers, the food system actors and the professional photographer involved in the research process.

Furthermore, a small group of participating youths are planning an exhibition to disseminate the findings.

Participation of youths with diverse backgrounds and motivations produced various perspectives on the youth's everyday food environments. Four themes depicting experiences were identified collaboratively with the participants and the researchers: 1) lack of resources to make sustainable decisions, 2) appealing and unhealthy snacks, 3) availability and accessibility of appealing and nutritious plant-based food in schools, and 4) the low appreciation of food.

Sharing pictures with other participants and the active role of the researchers facilitated participants' learning about the food environment and its influence on their choices. The majority of the taken pictures depicted a portion suggesting that some aspects of the food environment were hard to photograph and that the participants repeated the prevalent social practice of photographing food on a plate. Some participants also reported anxiety related to taking photos with a camera in a public space. Iterative photography would have been in place but the youths had challenges committing to a long project.

Case 3: Hungary, district VIII of Budapest

Photo-voice-based food environment mapping with single parents in the 8th district of Budapest

Authors: Vanda Pózner, Diana Szakál, Alexandra Czeglédi

In Hungary, there is an increasing number and proportion of new family patterns (i.e., cohabitation, mosaic families, families without children, and single-parent families) that differ from the traditional marriage-based family type (Máté, 2018). In recent decades, the share of single-parent families increased from 7% to 14% (Harcsa–Monostori, 2014). Therefore, in the PlanEat EU Horizon 2020 project, we started working with single parents, predominantly single mothers, in one of the most vulnerable districts of downtown Budapest. The aim of the research is to understand their perspectives, struggles and needs in relation to the local food environment in the 8th and 9th districts of Budapest.

To better understand their perspectives, a three-step mixed methodology allows us to collect (1) quantitative data on the food environment and (2) qualitative data on participants' subjective experiences and perceptions through photo-voice-based visual storytelling. The qualitative participatory methodology builds on the dimensions of the quantitative survey to gain a deeper, more reflective understanding of food environments.

The combined methodological approach allows researchers to include the availability, accessibility, price and socio-cultural aspects of participants' environmental food supply and environmental practices and promotion. The qualitative-participatory methods

complement the quantitative method and reflect the three food environments integrated into the survey (home food environment, food purchasing/purchasing/home growing environment and dining environment). Preliminary results showed that emotional and psychological factors are crucial for participants to make decisions within their food environment.

Case 4: Poland, Krakow

'Food itself is not a problem here'. Lessons from researching and designing transformations towards more inclusive food systems

Author: Ewa Kopczynska

Food security is a widely shared social value and a rationale for transformations towards more sustainable food systems. Groups with limited access to nutritious and culturally acceptable food are often the target of public interventions, NGOs, bottom-up activities and informal, everyday coping strategies. However, these interventions and initiatives are usually standardized and focused either on managing the consuming bodies (education, biopedagogy) or on food itself (food aid). Drawing on the results of existing research I argue for engaging wider, heterogenous social-material compositions which shape the eating experience. Applying participatory techniques and taking a closer look at food aid practices in real-life settings unveils the role of food arrangements and non-food material objects. These arrangements are not merely a company for food, but they co-define the eating situation. When designing more sustainable and inclusive food systems, we need to widen the focus from education and food to more complex arrangements. Diversity of these local arrangements needs to be recognized and reorganised for and with the groups being part of them.

Social practice theory provides the theoretical frame for the heterogeneity of eating experience: as a bundle of bodily activities, mental activities, material objects, meanings, knowledge, sayings etc. (Reckwitz 2002). The actor-network approach helps to grasp the active status of non-human and non-food actants, like tables and plates, packaging, TVs and refrigerators, but also pandemic, hygiene regulations, weather etc.

5 Discussion across cases

An interactive discussion followed the four case presentations. Our aim was to get to know more about (1) the question of inclusivity in research processes, and (2) the photo-voice methodology and its application in different food environment research contexts. We were interested to learn more about what challenges and opportunities researchers, co-researcher and participants meet in a participatory research process.

5.1 Inclusivity in research processes

Research on food environments needs to recognise — and, in some instances, expand what is meant by — marginalised groups in order to develop a more complete and inclusive perspective on food environments. Some of these groups can be easily identified with socioeconomic indicators: low-SES families, people receiving food aid, single parents, elderly retired persons and rural communities. However, some groups are hardly in the scope of food researchers' perspective and their marginal positions come from structural circumstances, e.g. working poor or people in care facilities, such as elderly homes, childcare institutions or hospitals, where particularly children are vulnerable due to their specific needs. These groups do not fulfil inclusion criteria per se, although their inclusion is essential we are to aim for more nuanced and robust food environment research.

In most cases, the factors negatively impacting food security are related to limited financial resources, but factors can also be related to infrastructural, geographical and knowledge/information dimensions, such as food literacy (Begley et al. 2019), and agency, which recently has been coined as another important dimension of food security (Clapp et al. 2022). The concept of foodscape together with the social approach can widen the perspective from individuals to groups, communities and social networks, like in the case of caregivers who are usually neglected when studying the food environments of people with health conditions. The foodscape concept helps to take a more personal perspective on food, compared to the food environment. It focuses on individuals' and collectives' subjective views of accessible options, opportunities, challenges and constraints, therefore it fosters the inclusion of these actors, who are vulnerable, in marginal positions, and deprived of their voice in public discourse. This scalar zooming in (minorities, individual perspectives) and out (local to regional and to global) can show the multiple contexts within which people navigate their food environments.

Another aspect of inclusivity in food studies relates to public institutions and public interventions aimed at food security goals. Even regional and local food strategies are implemented by complex, yet centralised institutions, operating within bureaucratic administration systems, which often represent hurdles for sectorial integration. For instance, food aid initiatives, policies aimed at decreasing social inequalities, and the means of providing social and financial support for those in need, tend to overlook the multilayer nature of food insecurity. Therefore, they tend to be effective when focusing on a specific dimension (eg. health, social, financial, educational etc.) but they very poorly deal with the compound nature of food practices, more systemic wicked problems, and atypical contexts. Institutional settings can also rely on decontextualised and reductionist understandings of food and health (e.g., calories, grams of protein) in order to

standardise their operations. This myopic vision of nutrition, versus a more holistic sense of well-being and social belonging, can be crucial towards (re)thinking inclusivity.

As an example, the situation of people affected by homelessness who — as food assistance beneficiaries — receive products that need to be cooked (e.g. dry rice, pasta, bottle of oil) which they cannot meaningfully use or consume. So while standardisation of food security policies is necessary for the programmes to operate on a large scale, reliance on outdated nutrition/public health paradigms risks overlooking the needs of some groups. It also enables an 'it's-not-my-department' logic (e.g., ministries and departments of health versus environment versus social services), developing blind spots that may result in further ignoring or stigmatising some marginalised actors.

5.2 Photo-voice methodology

Photo-voice is a qualitative and participatory methodology commonly used with marginalised groups or a site-based community through digital or analogue photography. Researchers and social workers alike use photographs to generate discussion and storytelling and to deconstruct specific, often social and economic, issues. Photography stimulates discussion and allows participants to see, document and discuss issues and valued practices through their subjective experiences. It is often used as a methodological tool in community development to capture individual and community aspirations, desires, expectations and overlooked knowledge. Participants' subjectivities are performed through photography, as they can communicate their values and choices in a less frontal and non-interrogative situation (Buding et al. 2018). Participants are actively performing through their subjectivity in the unfolding of their close, known environment, without predetermined value choices. Thus, in the application of photo-voice to food environment research, an elementary part of the visual methodology is that participants take photographs in their own food environment without the researchers pre-defining what the food environment might be, what it means in academic terms.

Single parents in Budapest and urban and rural young people in Finland who participated in the research took pictures as a kind of exploration; mobilising their own interpretations of their food provisioning and eating. The general research experience emerged from the abovementioned cases is that research participants learn about the food environment through their own personal activities and exploratory walks. Later on, they do through reflections on their photographs. They move from rudimentary definitions to a much broader and more complex understanding of the food environment that fits into their local, everyday experience. Although these complexities are highly site-dependent, even within one neighbourhood or street of a city, there are demanding dimensions of the food environment that participants experience and describe as actors. The personal dimension, according to the researchers, helps the participants to conceptualise and

understand larger economic, social and cultural processes through their own life situations. Through shared reflection in groups, researchers also gain deeper insights into the characteristic, hidden aspects of local food environments.

There are several ways to analyse the material, as photo-voice allows room for experimentation. In the Budapest case, single parents shared their experiences through photos during a focus group. They selected the images according to their own perceptions and shared them with the other participants while recalling their own experiences, feelings and memories through the images. They shared their relationship with food and their intimate and often taboo life situations. The researchers analysed the recordings of the focus group sharing together with their own notes. The analysis of the photos was thus done by the participants, and the analysis of the conversation was then carried out by the researchers.

The strict adherence to GDPR principles was noted as a drawback of the methodology by the presenters. If someone takes a photo of their own life situation, they cannot publicly share photos that include recognizable individuals without the permission of the individuals in the photo. In the vast majority of cases, the participants do not have the possibility to ask for the consent of the people in the photo, so the photos are altered or not shown publicly.

The experience of the Finnish case is that taking a photo in a public space provoked a feeling of unease among the young participants. The young participants were encouraged to use a camera to make the process more focused but they could also use their smartphones. The camera increased the visibility of the activity causing feelings of anxiety. In such situations, young participants were unsure of the appropriateness of the methodological choices.

Photo-voice can be challenging in some contexts, but in other settings it can be very engaging. Before adopting the methodology, participants should have a say in how they would like the data to be collected and what images they are willing to bring to the group discussion. Researchers may want to be vigilant when designing the methodology, e.g. monitor social media trends related to food so that participants do not confuse social media posts with images taken for research purposes.

5 Concluding remarks

In this session, we looked at different participatory food environment studies in Austria, Finland, Hungary and Poland, where marginalised experiences are at the centre of the debate. Food environment research, when it takes a top-down policy perspective, tends to ignore informal and grey-zone practices within the food environment.

Another challenge for food research relates to the concept of marginality. While some groups are easily identified as vulnerable in the local food system, some groups are hardly visible to food researchers because of their contextual and structural marginality. In order to overcome the blind spots in food environment research, a bottom-up approach is needed, which encompasses the marginality within a given socio-economic context. In order to identify vulnerable groups in the local food system, researchers have found it useful to complement the concept of food environment with the notions of food security and foodscape.

Critically designed participatory research can challenge the reductionist and standardised understandings of food and health that often characterise public and political institutions. Photo-voice, as a participatory and visual methodology, can playfully reveal the perspectives of those whose voices and needs are not taken into account in food-related decision-making processes. It does not merely create groups and forge communities, but creates opportunities to learn together and imagine alternatives based on their needs in the food system

6 Acknowledgement

References

Begley, A., Paynter, E., Butcher, L.M., Dhaliwal, S.S. (2019): Examining the Association between Food Literacy and Food Insecurity. Nutrients. 2019 Feb 20;11(2):445. doi: 10.3390/nu11020445.

Budig, K., Diez, J., Conde, P. et al. (2018): Photovoice and empowerment: evaluating the transformative potential of a participatory action research project. BMC Public Health 18, 432. https://doi.org/10.1186/s12889-018-5335-7

Clapp, J., Moseley, W. G., Burlingame, B., Termine, P. (2022): Viewpoint: The case for a six-dimensional food security framework. Food Policy, Elsevier, vol. 106(C).

FAO (2016): The State of Food and Agriculture (SOFA), Climate Change, Agriculture and Food Security, Rome.

Neve, K., Hawkes, C., Brock, J., Spires, M., Isaacs, A., Gallagher Squires, C., Sharpe, R., Bradbury, D., Battersby, J., Chaboud, G., Chung, A., Conaré, D., Coveney, J.Demmler, K., Dickinson, A., Diez, J., Holdsworth, M., Kimani-Murage, E., Laar, A.,Zorbas Creative media by Gavin Wren, C. (2021): Understanding Lived Experience of Food Environments to Inform Policy: An Overview of Research Methods. www.city.ac.uk

Reckwitz, A. (2002): Toward a Theory of Social Practices: A Development in Culturalist Theorizing. European Journal of Social Theory 5. pp. (2):243-263.

Turner, C. et al. (2018): Concepts and critical perspectives for food environment research: A global framework with implications for action in low- and middle-income countries, Global Food Security, Volume 18, September 2018, pp. 93-101.

Social inclusion through a 'SuperCoop'? Addressing exclusion by organisational innovation in alternative food provision schemes

David Steinwender[1], Andreas Exner[2], Sandra Karner[1], Dirk Raith[2,], Linda Fitzka[1]

[1] Interdisciplinary Research Center for Technology, Work and Culture (IFZ) Graz, Austria

[2]RCE Graz-Styria – Centre for Sustainable Social Transformation, University of Graz Austria

Abstract. Over the past years, in Graz (Austria), like in many other urban areas with a traditional agrarian hinterland, a variety of market- and community-based alternative food networks (AFN) have been established, including farmers' markets, box schemes, food coops, community supported agriculture initiatives (CSAs) and community-owned grocery stores. Given their overarching objective to sidestep conventional trade and market relations, both food activists and academics have seen a potential in AFN to transform food systems to become more democratic, socially just and ecologically sustainable. At the same time, it has been an open secret ever since that AFNs are still quite socially exclusive, appealing mainly to people that are relatively well-educated, well-informed and/or particularly well-off. In short, on the one hand, AFN members and customers have a relatively discerning and demanding idea of 'good food' and they can afford it. Low-income consumers or people with migrant backgrounds, on the other hand, are clearly underrepresented in AFN, whatever the form. This can be attributed to multiple and interlinked causes, which the authors have been exploring through various methods primarily in the context of two research projects: the first, 'Climate-friendly local supply in the Triester district"[84], focussed on the accessibility and possible improvements of a farmers' market; in 'CoopsForFood'[85] barriers to access to 'good food', in particular to participating in AFNs have been further explored to develop suggestions on how to foster social inclusion in food provision. To this end, the model of a multi-level AFN cooperative ('SuperCoop') was developed, connecting the concepts of food hub[86] and multi-

---

[84] https://www.ifz.at/en/projekt/climate-friendly-local-supply-triester-district; project report is not publicly available.

[85] "CoopsForFood: Diverse economies of food: From mainstream alternatives to the alternative mainstream" was implemented by RCE and IFZ in cooperation with Raiffeisenverband Steiermark. The project received funding from the Climate and Energy Fund Austria within the Energy Transitions program (2020-24) under the grant number: 883516

[86] There is a wide array of definitions currently used (see. Horst et al. 2023). Our conceptualisation of a food hub is broad as well – following the general definition from Morley at al. (2008) "on the simplest level

stakeholder cooperative – with a clear focus on how to eventually implement it in practice. The starting point of this effort was the identification of those dimensions that currently prevent (or abhor) people from getting their food from AFN. The discussion of these 'factors of exclusion' (or inclusion) on different dimensions is at the core of the present paper.

1 Introduction

Alternative food networks (AFN) offer options for distributing food that are going beyond capitalist retailers. These fall into two categories. First, marked-based AFN such as farmers' markets, farmers' shops, box schemes and on-farm selling circumvent mainstream distribution channels by creating and operating niche markets; second AFN engage communities in food production and distribution without market exchange. To this latter form food coops, community supported agriculture (CSAs), community gardens and community-owned grocery stores belong. As in many other cities (Jarosz 2008) both market- and community-based AFN have been developed in the city of Graz, Austria. In academic literature as well as within food activism, AFN have been claimed to have potential to transform food systems (e.g. Edwards 2016).

Interest in regional food supply schemes such as AFNs has further increased due to the COVID pandemic that has destabilised food supply chains (Aday and Aday 2020, Thilmany et al 2021), demonstrating that global food chains are not resilient (Hoobs 2020). In addition, this also adds a long-term trend within urban populations to (re-)connect with nature. Many people started gardening and growing their own food during the pandemic (Nicola et al. 2020, Mullins et al. 2021, Page 2021).

Yet it has been questioned in the literature whether AFNs are indeed able to unlock transformative potentials since in many cases, they remain socially exclusive, for instance regarding people with migration backgrounds and/or low educational attainment and/or low-income households (e.g. Kirwan et al. 2013). This weakness is becoming increasingly important since rising inflation challenged especially low-income households that had already been food insecure before (Chepeliev et al. 2023). For instance, the number of customers of the 'Wiener Tafel' food bank in Vienna increased by 40 % between 2021 and 2022.[87]

---

the Food Hub can represent any kind of organizational model where food sourcing and supply is coordinated, and may be contrasted with a wholly dispersed market system (becoming more credible through internet shopping) comprising of [sic] direct links between the producer and the consumer" (p. 3)

[87] https://wienertafel.at/lebensmittelrettung-gegen-armut/

The transdisciplinary research project *CoopsForFood* aimed at exploring how to bridge the gap between small-scale producers and processors organised within AFNs on the one hand and households with low income and/or educational level and/or migrant backgrounds on the other hand that are often not taking part in AFNs. Together with two neighbourhood centres, which were partners in this project, the general conditions in three neighbourhoods of Graz[88] were examined more closely in order to identify barriers to participating in AFN. Against this background, we developed AFN models that shall take into account the lived realities of those social groups that are rarely participating in AFNs as well as of potential suppliers that may not be addressed by usual types of AFN.

To this end, CoopsForFood was to design a cooperative food provisioning network that included elements of various AFNs, in very individual, modular ways, in order to address specific local needs of the communities that support it – and that should be supported by it. This 'SuperCoop', as we called it, should explicitly be open, supportive and attractive to disadvantaged groups. In our research, we therefore assessed 1) the access to 'good food' by reflecting the concept of 'food deserts' to AFNs, and 2) the conditions for participation of disadvantaged households in cooperative provisioning schemes, based on both, an analysis of historical and existing cases such as CSAs and food coops.

In the following, we will first outline our conceptual approach to identifying dimensions and causes of exclusion to access of AFNs taking stock of the literature on food deserts. Next, we discuss the potential role of AFNs in transforming food systems as it has been claimed in the scientific literature in view of access to healthy food. Building on these theoretical considerations, we then describe in more detail the research project CoopsForFood that investigated exclusion to access to AFNs and aimed at developing an organisational AFN model that has better chances to operate in socially more inclusive ways and combat food desert phenomena. In the discussion of our results, we highlight practical challenges to making AFNs more inclusive and thus to unlock their transformative potentials towards healthy food for all. In this way, we are contributing to the growing literature on food system transformation with a special focus on disadvantaged population groups, which have so far been somewhat neglected in scientific research and Austrian food activism.

---

[88] In Graz there are 17 districts, which have their own elected council as representation of interest, but no separate administration. The neighbourhood in our sense is not formally defined, but is historically grown, or created for certain purposes like community development/social work or place marketing.

2 Context and Background

2.1 Restricted access to good food

Good food is understood differently by various social groups (Exner & Strüver 2020), and is not equally accessible to everybody. Adopting a nutritional understanding of good food in terms of healthy food, the concept of a 'food desert' is often used to identify a lack of access. Food deserts describe food insecurity in a certain area, where access to healthy (fresh, nutritious, little processed/unprocessed) food is limited. Correspondingly areas with a high proportion of fast and junk food shops are often called 'food swamps' (Rose et al. 2009).

Food deserts are usually assessed with spatial-statistical methods (e.g., by counting the number of shops providing healthy food in a certain area, measuring the distance to shops, the availability of mobility options, price, and product variety) and related to the socio-economic features of residents such as income, education, ethnicity, and age (see for example Jaskiewicz et al. 2016).

Shaw (2006) developed a typology of food deserts that show the complexity of the dimensions and causes of food deserts relating to ability, assets, and attitudes.

An ability-related food desert describes the lack of physical access to healthy food, which is not only determined by spatial distance but also by topography (slopes, hills), means of transport, carrying capacity of consumers and weight of purchase, the capability to move, which is limited for the elderly or people with general mobility restrictions, as well as barrier-free shops and motoric skills (e.g. opening of packaging). In this sense, the food desert is a relational concept pertaining to the characteristics of specific population groups. To illustrate the complexity of this food desert dimension, Wang and Qiu (2016) came to the conclusion that access to fresh food could theoretically be better in socio-economically deprived neighbourhoods since the distance to the next retailer might be shorter than in wealthier areas that often show lower population density and thus have lower retailer density. Under these premises, the availability of public transport (and the possibility to use it) is key to improving access to fresh food, assuming that residents lack access to cars (Wang and Qiu 2016, Wang et al. 2016). Other possibilities to remedy ability-related food deserts thus are e.g. car sharing or (private) provision services (Conveney and Dwyer 2009).

Accordingly, Ver Ploeg et al. (2015) make a strong case to take more into account individual measures of food access as compared to commonly used statistical area-

based measures since limited access to healthy food can also occur in higher-income areas that include low-income households.[89]

Asset-related food deserts (Shaw 2006) are caused by lack of financial access, since healthy food might be more expensive than unhealthy food and thus is not affordable for certain social groups. This type has also been referred to as 'food mirage' (see e.g. Short et al. 2006, Everett 2011, Sullivan 2014), which denotes areas where enough food is available, but prices are beyond the means of low-income households, impeding access. Not only the affordability of the food is relevant in this regard, but also related costs, such as fees for delivering, and the financial capacity to afford appropriate and sufficient storage and cooking facilities have to be taken into account (Shaw 2006).

Attitude-related food deserts refer to knowledge, awareness, values and other socio-psychological aspects that prevent people from accessing healthy food. This type of impediments is in part captured by the notion of 'food literacy', which "is a collection of inter-related knowledge, skills, and behaviours required to plan, manage, select, prepare and eat food" empowering individuals and households to make their food choices according to their needs (Vidgen and Gallegos 2012, p. 54). Most food literacy definitions include either or both, critical knowledge (information) and functional knowledge (skills) (Truman et al., 2017). The lack of access to healthy food (Matheson et al. 2008; Congdon 2019) and the existence of 'food swamps', which Cooksey-Stowers and colleagues (2017) consider a more accurate term rather than 'food desert', contributes to obesity, malnutrition and other health problems. Daily routines, visceral understandings of taste, and corresponding mind sets embody this type of knowledge, being expressed in e.g. average time dedicated to cooking or food preferences. One example described in the literature refers to migrants favouring specific vegetables and fruits being unavailable in local markets (Shaw 2006).

Although the concept of food desert is offering a useful analytical grip on dimensions and causes of the underprovision of healthy food, it has been criticised for implicitly assuming space to be a mere container for social relations, naturalising societal structures and processes, and how these are inherently intertwined with the production of space. On an empirical level, this theoretical weakness, for example, undermines appropriately reflecting work and everyday mobility that affect how food is regionalized through daily routines (Shannon 2014). Correspondingly, the food desert concept is ill-equipped to acknowledge and approach analytically how different dimensions of social disadvantage interconnect (Corcoran 2013, Shannon 2014, Reynolds and Cohen 2016, Tornaghi

---

[89] This specific situation is of relevance for our case study in Graz, since Graz has in terms of income very heterogeneous neighbourhoods – although there are tendencies of certain income groups living in specific areas.

2017). In this perspective, combating food deserts requires more than simply raising the density of supermarkets or grocery stores, as for example Cummins et al. (2014) have shown empirically in a case study on Philadelphia. To better capture how different dimensions of social exclusion from access to healthy food intersect, it has been suggested to replace the term food desert with food justice (Purifoy 2014) or the notion of food apartheid (Joyner et al. 2022, Shannon 2014).

Rejecting the individualisation of health and other issues of social inclusion, an understanding of the systemic causes of unequal access to healthy food appreciating the perspectives and needs of different social groups is crucial to empower communities and establishing or enhancing food democracy (see Hassanein 2003, Shannon 2014, Holt Giménez and Shattuck 2014, Tornaghi 2017).

Food system transformation has been repeatedly connected with AFNs (e.g. Marsden et al. 2018; Sonnino and Marsden 2006). While this discussion has mainly been focused on AFNs' potential to change economic and ecological food relations towards a higher degree of sustainability, issues of food justice have been rarely addressed so far in this regard. However, food justice is not only important in itself, in particular with respect to the claim of fostering food democracy associated with AFNs (Levkoe 2006, Hassanein 2003), but also regarding the question of whether AFNs can indeed create new economic and ecological food relations, which requires the possibility to appropriately address the needs of broader swaths of populations than AFN are currently able to do.

2.2 Alternative Food Provision Schemes

As an alternative to the corporate food regime based on capitalist supermarkets and industrial food production (McMichael 2013), various AFNs arose in recent years, such as food coops, CSAs, community-owned grocery stores, and community gardens. A considerable body of research since then has discussed their potential to contribute to the transformation of the current global food system in the context of social movements and grassroots innovations (Sage 2014, Sage et al. 2020). This entails a conflict between different rationalities of food provision that go along with specific spatial characteristics, corresponding with structures of the built environment, broader issues of urban planning, as well as daily routines and mindsets of consumers. Supermarkets are usually located at places with a high potential for reaching as many paying customers as possible, with sufficient space for the store itself and for parking, and convenience in terms of traveling time and proximity to complimentary shops. Based on these fundamentals that have also been supported by marketing and consumer research (Jaravaza & Chitando 2013), supermarkets have become the main and by far most important places of food provision in industrial countries. AFN, on the other hand, follows a very different logic. They are linked to the re-embedding of food provision to local communities beyond capitalist

market relations (Goodman et al. 2012). They are therefore also operating beyond well-engrained and institutionalised arrangements of food distribution structures. Farmers' markets are seen as an additional form of food provision in the food desert debate (Wang et al. 2014, Larsen and Gilliland 2009). Yet this also holds true for other short food supply provision schemes such as CSA, food coops, community gardens and farms, community-run resp. -owned grocery stores or public kitchens operated by citizens actively go beyond capitalist producer-consumer market relations. However, unlike farmers' markets, these approaches require the participation of their members in organising food production and/or distribution and/or consumption.

Mainstreaming these alternatives is challenging. Apart from financing and logistics that are becoming increasingly demanding when upscaled, many of them do not perform well regarding social inclusiveness (Guthman 2011). Even though the AFN movement originally evolved in response to food inequity and aimed to solve issues of access to healthy food for disadvantaged social groups by means of locally-based bottom-up solutions (Allen 1999), in practice it turns out that they tend to be quite elitist and exclusive (Goodman et al. 2012, Exner & Schützenberger 2018). Initiatives are often lacking social diversity, mainly addressing people of medium and higher socio-economic status (Reynolds and Cohen 2016, Guthman 2009). People participating in AFN are often well educated, have a high level of food literacy and consider themselves active citizens (often referred to as 'ceatizens' or 'food citizenship': Wilkins 2005, 'food democracy': Hassanein 2003). Moreover, instead of actually producing social justice, AFN in reality often reproduce hegemonic relations of defensive localism that neglect structural inequalities (Winter 2003, DuPuis & Goodman 2005). Julie Guthman (2004) even indicates that organic food production and consumption and corresponding food movements are racialized (Holt Giménez & Shattuck 2011, Allen et al. 2003).

Against this backdrop, we investigated food access in three neighbourhoods in xthe Austrian city of Graz, and explored conceptual possibilities to re-organize AFNs to foster social inclusion by engaging in a transdisciplinary research process with various stakeholders.

3 Methodology and research design

A participatory research design was applied to assess the options, prerequisites, and limits of the model of a multi-level AFN cooperative ('SuperCoop'). The suggested model should not only integrate the perspective of consumers but also the needs of producers, processors and suppliers. To develop a context-specific SuperCoop model, we first investigated shortcomings in the current supply situation in our three case study areas in

terms of accessibility and inclusiveness, which we clustered along the dimensions listed in the table below.

As a basis for drafting the SuperCoop model, we analysed existing AFN types along their supply chains to identify their characteristics, strengths and weaknesses. Good practice examples were then identified and analysed in more detail mainly through literature work, for some we also carried out exploratory interviews with key actors.

As a basis for the identification of 'good practices' we first needed to define what we would consider as AFN and what not. We took a normative and positive definition of ALN as a starting point, which sufficiently exhaustively and clearly identifies its ideal characteristics in contrast to the conventional food system. The lack of such a definition or the mostly purely negative and vague definition of ALN as "non-conventional" was also criticised by the most comprehensive meta-analysis on the use of the term ALN to date (Forssell & Lankoski 2015). Based on this and a review of more recent literature (cf. for example Michel-Villarreal et al. 2019), we developed an analytical perspective that distinguishes between four central dimensions, each with three separate criteria: 1. *Re-Socialisation*, which refers to relationships, values and governance; 2. *Re-Localization*, which implies physical, geographical aspects, transparency and information flows; 3. *Re-Naturation*, referring to the relationship with nature and farming practices; and 4. *Re-Skilling,* which implies the re-acquiring of traditional practices, or the adaptation of skills and knowledge in line with contemporary requirements. This conceptual framing was associated with the normative aspects of the social form of a cooperative (genossenschaftliche 'Sozialform' see Flieger 1997), which matches particularly with the idea of re-socialising the food system. Consequently, for the inventory of 'good practices' we also included the following core principles of cooperatives as analytical categories: subsidies, solidarity, democracy, and identity.

In the scope of the closer investigation of the good practices, we were particularly interested in two aspects: a) the business model of a SuperCoop and b) what types of food hubs might be relevant for our context. Both dimensions of the SuperCoop were initially drafted and consequently discussed with various practitioners and stakeholders, including representatives of farmer cooperatives, neighbourhood centres and their clients/visitors. This helped to refine the SuperCoop model and to better understand its potential benefit for the envisaged target groups, how it should and could work, and potential problems. This work also laid the foundation to have a closer look at the dimensions of social exclusion.

For our analysis, we started with the three-dimensional typology of the concept of food desert developed by Shaw (2006), and added aspects of individual food barriers. In addition to spatial-statistical assessments, we clustered dimensions and causes bottom-

up based on Ver Ploeg et al. (2015) and Shaw (2006), following an iterative process of induction and deduction, to identify relevant indicators.

As a starting point barriers were analysed along spatial-statistical indicators, e.g. the presence of grocery stores within a certain area. The resulting set of dimensions was then extended to include other dimensions such as finance, belonging, food literacy and meal culture.

Dimension	Indicators
Space	- geographical/spatial distribution of AFN - mobility of individuals
Time	- opening hours - individual time budgets
Finance	- income, available budget - pricing of products
Belonging: identity, social ties and community	- socio-economic aspects different kinds of values (regarding group formation but also quality aspects of food) (social) experiences linked to food provision
Food literacy	- knowledge about food (regarding nutrition, cooking, sustainability etc.) - skills to prepare and conserve food - awareness about ethical aspects
Meal culture	- eating habits and preferences (incl. dietary styles) - cultural and religious norms - intolerances and other health aspects - available product variety

Space and Time

We investigated space on the one hand in regard to the distribution of grocery shopping/sourcing facilities, and on the other hand concerning the distance to be covered to procure food – whether shopping, food-sharing or sourcing food from a garden. Distance also includes a temporal dimension, which refers to the individual capacity of mobility. Additionally, we looked at other temporal aspects such as opening hours and investigated obstacles regarding the individual time budget.

Finance

The financial dimension was put under closer scrutiny in the Triester neighbourhood: food products were chosen according to their availability at the Triester farmers' market. Prices from the Triester market were compared with another farmers' market of category

2^{90} to check the representativeness, and then compared with those of discounters and a regular supermarket in the neighbourhood (Langmaier 2023).

Belonging

Another aspect of the analysis concerned the participation of consumer members in food coops, CSAs and cooperative shops, pertaining to belonging. Both, the overall socio-economic aspects of community building as well as interpersonal relationships were considered as relevant aspects in regard to belonging. For the exploration of socio-economic factors, a literature survey was conducted that provided information on the socio-economic background of consumers in AFNs. Interviews with CSA operators and other producers complemented the information. Community and interpersonal relationships were also examined through interviews and exploratory conversations with key actors from neighbourhood centres.

Food Literacy

The assessment of food literacy is definitely of relevance in the context of AFN participation, as the majority of the available products provided in AFNs are fresh and unprocessed, which requires knowledge about food and processing or preparation (Truman et al. 2017). However, this aspect was not explicitly in the focus of our analysis from the beginning, and further empirical work will be necessary to draw more specific conclusions for the given case.

Meal Culture

Finally, we presume that aspects of 'meal culture' (Teherani-Krönner, 2014) are of relevance as well. This particular issue is still underway within a follow-up project[91] (see Czeglédi et al. 2023 forthcoming), and only some illustrative preliminary findings can be presented in this paper.

3.1 Methodology

To gather data various methods were applied, which are briefly described below. More detailed descriptions of the methods, can be found in the final report of the CoopsForFood project to be published by the End of 2023 (Exner et al. upcoming 2023).

---

[90] Farmers' markets in Graz are divided into two categories by the municipality: Category 1 markets are located in the city centre and in better-off neighbourhoods, and the product prices in these places are higher than those of category 2. Stand fees are also higher in category 1.

[91] The project 'Culture.Kitchen' is a intercultural cooking activity managed by Transition Graz together with neighbourhood centres, inspired by the "Kitchen for all", where food is cooked and served for free and donations finance running costs. In practice, on each date, the chef changes, so different people cook their favourite dishes.

School survey

As part of a course at Graz University[92], a multilingual (4 languages) survey (n=141) was conducted with parents in the elementary school in the Triester Viertel[93] and as a reference in the Waldorf school in Waltendorf[94], where parents formal education and income might be considered higher compared to the district of Triester. The aim of this survey was to explore how parents conceptualise 'healthy food', its importance and which food qualities relate to that, their shopping habits, and cooking behaviour. Additionally, the children (n=48) in both school documented their favourite dishes and eating habits in a diary (photos of lunch boxes).

Street Survey Triester (further referred to as 1st street view)

The first multilingual survey in the Triester neighbourhood (7 languages) was carried out with the support of two students, who based their Bachelor Thesis on the data (see Langmaier 2023, Janezic forthcoming 2024) and the Neighbourhood Centre Triester during summer 2021. Local residents (n=62) were asked about their satisfaction with the food supply in the neighbourhood and about shopping and food preparation habits.

Street Survey in Three Neighbourhoods (further referred to as 2nd street view)

The second street survey was implemented by students in spring 2023 in the scope of an interdisciplinary course[95]. Residents from three neighbourhoods were approached: Triester (n= 85), Grünanger (n= 96) and as a control group Eggenlend (n= 136). The questionnaire included questions about shopping habits, their relation to ALN, and barriers to access ALN in their districts.

EXPERT INTERVIEWS

Interview with political representatives

In 2021 interviews with local politicians (3 district councillors, 1 local councillor; n=4) connected to the Triester neighbourhood were implemented. They were asked about their viewpoints on the current situation of food supply in the neighbourhood and their perspectives in regard to (possible future) direct marketing offers.

---

[92] IP Food Justice in Sustainable Food Systems: Wie können fair & ökologisch nachhaltig produzierte Lebensmittel für alle erschwinglich sein?
Lecturers: D. Steinwender, S. Karner, D. Raith. Winter Term 2021/22, Uni Graz. https://online.uni-graz.at/kfu_online/ee/ui/ca2/app/desktop/#/slc.tm.cp/student/courses/682821
[93] http://www.vs-triester.at/wp/
[94] http://waldorf-graz.at/
[95] IP Food Justice (Inwieweit kann sich Graz nachhaltig und sozial gerecht durch verschiedene Formen der urbanen Lebensmittelproduktion versorgen?).
Lecturers: D. Steinwender, S. Karner, Anita Thaler (IFZ). Summer Term 2023, Uni Graz https://online.uni-graz.at/kfu_online/ee/ui/ca2/app/desktop/#/slc.tm.cp/student/courses/738939

Interviews with AFN practitioners

The farmers of the Triester neighbourhood farmer's market (n=6) were interviewed in spring as part of the "Climate-friendly local supply in the Triester district" study.

During the winter term 2021/22 further expert interviews were carried out by students (see footnote 9) with farmers, who do direct-marketing through a farm shop (n=4) and with a processing farmer (n=1), who also sells online, about their understanding of "good food", supportive and challenging conditions of their current marketing and their perspectives on sustainable and just food system.

In the scope of the student's course at Graz University in spring 2023 (see footnote 12), further expert interviews (n=6) were carried out with actors from Graz based alternative food networks, which included a CSA farm, a self-harvesting business, a foodcoop, a permaculture garden designer, Foodsharing Graz and a shop for regional products. The interviews addressed questions about their practices, supportive and challenging framework conditions and experiences with their customers.

Moreover, constant exchange was carried out through the whole project (between May 2021 and August 2023) with a representative of the Styrian Chamber of Agriculture on the needs of farmers, innovative agricultural cooperatives and his assessment of CoopsForFood results and proposals.

Interviews with Kitchen Operators

Further expert interviews (see footnote 9) were carried out with the central community kitchen of Graz (n=1) and a small locally sourcing restaurant (n=1) in order to explore processes and requirements for kitchens, such as sourcing and supply, marketing, and the serving respectively delivery of food.

Interviews with Charity Institutions and neighbourhood centres

In autumn 2022 interviews (n=2; see footnote 9) were implemented with representatives from charity institutions, the Tafel Graz (operated by the Red Cross) and the Vinzimarkt. The aim was to gain insights about organisational framework conditions, food supply practices and socio-economic aspects in regard to their clients.

Throughout the project, constant exchange with the two involved neighbourhood centres (Triester and Jakomini) was carried out. Additional exchange happened with the neighbourhood centre Eggenlend.[96]

---

[96] Which also services the control group neighbourhood of the street survey.

Interviews with Representatives from the Health Sector

Due to the close relation of the food to health topic, interviews were also carried out with representatives (n=2; see footnote 9) from the health sector about the current situation of nutrition-related challenges they see or anticipate, measures to address and support citizens with a particular focus on vulnerable groups, and strategies for future developments.

FOCUS GROUPS

Focus Group Food Supply Triester

In spring 2021 a focus group comprising a representative from the neighbourhood centre, some residents and local political representatives (n=6) were invited to discuss the local food supply situation in the Triester district. The aim was to collect participants' perspectives on the current situation and to discuss ideas for improvements, particularly focussing on short food supply options.

Additionally, a focus group with residents (n=4) of the Triester neighbourhood was conducted in autumn 2021 to explore their viewpoints on the farmers' market and other alternative modes of local food. Participants were asked which barriers they experience in buying via direct sale, and what would need to be improved to make short food supply modes more accessible respectively attractive (Langmaier 2023).

WORKSHOPS

'Lunch Table' Workshop

This half day workshop invited local residents (n=12) of the Jakomini district to explore their point of view on the framework conditions (willingness, preconditions, etc.) that would make the participations attractive respectively possible in an alternative supply structure such as a CSA. The workshop was linked to the 'Lunch Table' ('Mittagstisch') that is regularly organised by the Social Medical Community Centre Liebenau (neighbourhood centre Jakomini) and well established. The 'Lunch Table' is a joint cooking and eating activity, which also serves as important social gathering. Residents can join in the cooking or just come to eat. Those who eat pay a small symbolic fee of 1-2 Euro.

Stakeholder Workshop TdK III

In the scope of the transdisciplinary conference 'Transformation durch Kooperation III' (TdK III) in Sept 2021 a workshop[97] was held with different stakeholders (n=21) from the ALN field (food production, processing and logistics) and interest groups (cooperative, NGO). The aim was to explore current practices of cooperative food initiatives with regard to logistics, financing and organisational structures, and to discuss potential requirements for a SuperCoop.

PARTICIPATORY OBSERVATIONS

Exploratory District Walks

The research team walked through the Triester neighbourhood several times to gather data and experience the environment to gain a deeper understanding of the area. Twice representatives from the neighbourhood centre guided and accompanied the research team. During these walks, they explained how certain areas are used, and what residents regularly tell them, where there is a need for improvement in the area, or where they perceive unpleasant conditions.

In the neighbourhoods Jakomini und Grünanger virtual round walks with Google StreetView were organized in autumn 2021 together with a university course (see footnote 9).

GEO-SPATIAL ANALYSIS

For the spatial and temporal dimension, a Geographical Information System (GIS) analysis was conducted using the Open Route Service[98], in which the catchment area of supermarkets and farmers' markets was calculated including three isochrones. The locations of the supermarkets were extracted from OpenStreetMap and missing entries were added. The isochrones were determined according to walking times of 3, 5 and 10 minutes, assuming the average walking speed for non-handicapped persons. This analysis was carried out city-wide to explore in which respect the situation in the three case study areas differs from other parts of the city. Small and/or ethnic shops were not recorded, since there are none in the three target areas.

---

[97] Chancen und Herausforderungen für genossenschaftliche Vermarktung. Summary Report available at https://www.xn--ernhrungssouvernitt-iwbmd.at/wp-content/uploads/2022/03/Tdk3-Nyeleni-Herbst-2021-Bericht-final.pdf
[98] https://openrouteservice.org/

4 The CoopsForFood Project

The project 'CoopsForFood' had two main, interlinked objectives: to explore the reasons for social exclusion in AFN and to develop an innovative AFN model, the so-called 'SuperCoop', and to explore its potential to improve the accessibility to healthy food for all.

4.1 Case study areas

We chose three target areas in Graz, which were investigated more closely to identify the barriers to participating in existing AFN.

Two of the target areas ('Triester' and 'Grünanger') are neighbourhoods that are a bit remote from the city centre, but not peripheral at the very edges of the city located. Both are low-income neighbourhoods with a high percentage of people with migration backgrounds. Both areas provide quick, nearby access to green spaces such as parks or riversides.

The third target area of the CoopsForFood project is situated in the centre of the Jakomini district which is socio-economically more diverse regarding its residential structure. The access to supermarkets is better compared to the other two neighbourhoods. There are also a few small speciality shops, but these are not attractive for low-income households. There was also a farmers' market nearby, which recently has been discontinued except for one stand delivering on a pre-order basis.

All three neighbourhoods are focal points of the Graz model of community social work. Respective neighbourhood centres are reaching out to support disadvantaged people, offering various services to promote social inclusion, health and sustainability.

4.2 The 'SuperCoop' model

The SuperCoop, at its base, is a model for a multi-stakeholder and multi-level cooperative that aims to combine the benefits and potentials of AFNs (such as CSAs, food coops and community-owned stores) while at the same time making them more inclusive, i. e. accessible, supportive and attractive to low-income households (see chapter 5). The basic rationale of the SuperCoop concept in view of food system transformation towards a higher degree of social inclusiveness relies on scale and network effects. Community-based AFN should become more accessible through pooling resources, e.g. in terms of workload and price, and by making democratic structures more inclusive through opportunities for participating in decision-making that more properly take into account values, attitudes and spatial-temporal constraints of members from various social groups.

Moreover, the model should be able to integrate a broader range of food system actors as AFN usually achieves to do. In this way, the potential transformative impact should be maximised by engaging a variety of stakeholders to restructure supply chains within the urban food system in a more holistic way. Variants of such a cooperative were developed, including different business models and stages of expansion in terms of a number of links in the supply chain and the design of "food hubs" at its end.

For both dimensions (business model and hub), the SuperCoop model was to develop characteristic but scalable ideal types of possible implementations and describe them in as much in detail as possible. This approach was based on the experience of many practitioners that there is no one-size-fits-all model (even in three variations), but that any successful innovation in how AFN operate, such as the SuperCoop model, must consider the specific local needs of those that shall start and run it. Thus, a broad range of options in view of a SuperCoop exist that will eventually consist of a mix of those ideal types and/or their modular elements.

Three typical business models of a SuperCoop were developed, based on its supposed purpose/function:

1) A comprehensive production and marketing cooperative, similar to German CSA cooperatives[99] in which agriculture, processing and logistics are united under one umbrella.

2) A marketing cooperative including elements of cooperative supermarkets or food hubs with one or more locations.

3) A platform cooperative for sharing a common infrastructure, be it logistical or digital.

Similarly, three ideal types of food hubs were defined, based on local needs and resources:

1) A cooperative grocery store including elements of existing models, many of them recently founded[100].

2) A solidary farmers' market inspired specifically by the Zeybu market in Grenoble, France.[101]

3) A food and cooking cooperative that extends existing practices of food coops and activities of neighbourhood centres.

---

[99] See https://solawi-genossenschaften.net/ for further information
[100] E.g. La Louvre Paris https://cooplalouve.fr/ or MILA Vienna (https://www.mila.wien)
[101] https://www.lesamisduzeybu.fr/?page_id=332

Food Hubs can generally be placed in different facilities, including neighbourhood centres, schools, retail and other companies or restaurants.

The 'Lebensmittelpunkte'[102] in Berlin represent a practical example worth following as this initiative fulfils a number of functions. It provides a kitchen that can be used for communal catering, neighbourly cooking and cookery courses, a dining area, a depot, a business space/market hall, a commercial catering facility also available for educational purposes, an event space and a gardening area – facilities that are, not least, meant to facilitate activities in the community. They could be easily adapted for other purposes as well, such as open cooking, sharing and educational events on food on a regular basis – similar to the *Culture.Kitchen* format mentioned earlier.

As a result, a food hub could accommodate – as a one-stop shop – a variety of issues linked to food, from communal culinary events and cooperative provisioning to nutritional and health information. As an element of community work, neighbourhood centres could receive a corresponding (public) mandate to include this in their core work – true to the recognition of food as a 'total social phenomenon' (Mauss et al. 1954) that's as diverse, divided and possibly unjust as society itself, but also has the power to bring people together.

5 Results

In the following, we first present our results regarding the dimensions and causes of food insecurity in the three case study areas. Consequently, we relate these findings to the SuperCoop model, laying emphasis on how this model is expected to alleviate these causes in view of transformative, inclusive food system change.

5.1 Finance

Regarding the financial dimension of access to healthy food, several aspects operate as potential barriers for participating in AFN. The most important factor is product price. Not surprisingly, discounters usually charge the cheapest price, followed by supermarkets and AFN. However, unprocessed seasonal products can sometimes be cheaper through direct sale, e. g. at the Triester farmers' market, than in shops (see table 1 in Annex 2). The prices of participating in a CSA cannot be compared with product prices of other schemes.[103] Two existing CSA harvest share prices were compared having a difference

---

[102] https://ernaehrungsrat-berlin.de/lebensmittelpunkte/
[103]Though no such thing exists in a regular CSA in the usual sense of a commodity produced for a market, since CSAs replace conventional commodity exchange by pooling financial means of

of 25 % per week, which sounds significant but does not say anything about the eventual volume and quality of products received in return.

When it comes to energy-price induced inflation lately, prices of organic products and AFN prices have not increased that much, compared to conventional food products, due mainly to the lower dependence on fossil fuels and materials (RollAMA food basket study 2022[104]).

According to a survey conducted among parents of pupils from the Triester elementary school and the Waldorf school, the total amount spent on food per household does not diverge very much, but wealthier households spend considerably more on food per capita.

Based on a review of literature and good practices to find ways of enabling access to AFN for low-income households, we found two types of 'solidarity mechanisms': 1) internal redistribution (including contributions from farmers and consumers) and 2) support through public funding (Exner et al. upcoming 2023). The first option of internal redistribution according to income among consumers implies that those with higher income pay more, and thereby co-finance the participation of members with less income, e.g. through solidarity boxes or graduated prices for products or shares. This is already practised in several CSAs on a voluntary basis.[105] Equally conceivable would be a contribution from producers for 'loyalty' in purchasing, as for example 'Les Amis de Zeybu' in Grenoble[106] does. The latter also involves cooperation with a social market, which guarantees anonymous purchasing and anonymity in terms of need to avoid stigmatisation (Edwards 2021, Hoggins & Fraser 2017). Likewise, public subsidies for food-distributing institutions, certain businesses or even adapted forms of social assistance (e.g. voucher system) could lower the price level for low-income customers (Nicolini and Milanesi 2016).

---

consumers, planning production collectively, prepaying produce, and then receiving these, often mediated through voluntary work.

[104] According to the RollAMA food basket study for the first half of the year 2022 prices for conventional food rose for 7,8%, while organic food increased only for 3,5% compared to 2021 (https://amainfo.at/).

[105] Sees for example http://www.xn--ernhrungssouvernitt-iwbmd.at/es-wiki/images/3/32/CSA-Broschuere_AT_Kons.pdf, p. 17

[106] https://www.lesamisduzeybu.fr/?page_id=332

5.2 Space and time

In our analysis we compared two kinds of grocery shopping facilities: a) supermarkets, since they represent the main shopping facilities for food, and b) farmers' markets, because they are widespread and have a long tradition in Graz.[107]

As Figure 1 below shows, supermarkets cover a much higher catchment area than farmers' markets within 5 resp. 10 minutes walking distance. Supermarkets also cover almost the whole city within the 10-minute isochrones, except for a few gaps representing certain industrial zones as well as the mainly hilly outer districts, which are less densely populated.
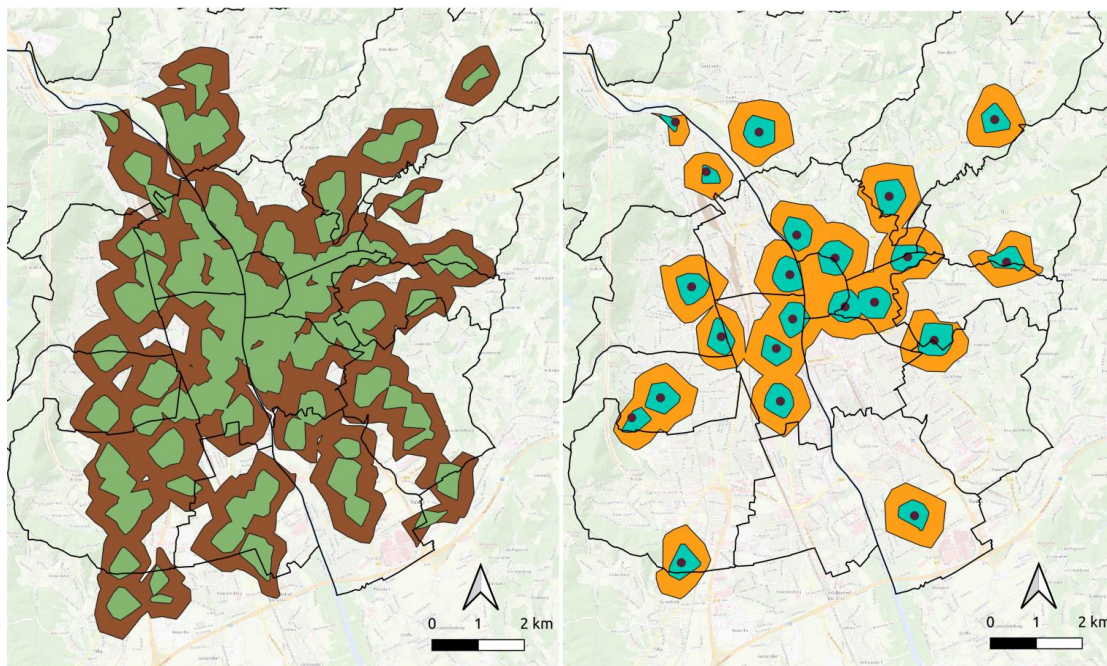
Figure 1: supermarkets excl. small shops and ethnic stores, isochrone: 5 minutes (green) and 10 minutes (brown) walking distance (picture in the left); farmers market, isochrones: 5 minutes (cyan), 10 minutes (orange) walking distance (picture in the right).

For people with limited mobility, not only the lengths of the distances to be covered are relevant, but also the path to be travelled in itself. This may imply hurdles which healthy people might not consider as a challenge, e.g. larger streets without traffic light controlled or barrier-free foot crossings, hilly terrain resp. steep slopes and stairs. Moreover, the individual perception of safety is relevant as well. According to information from the manager of the neighbourhood centre Triester, some people do not feel confident e.g. walking on certain paths alone in the dark.

---

[107] Also CSAs use these markets to distribute their harvest shares.

Such barriers can be found in the Triester neighbourhood, where the majority of respondents stated that they do their shopping on foot. Supermarkets are situated mostly at the edges of the neighbourhoods, and other services and shops for daily needs have become rare. Given the increasing number of places selling unhealthy foods (e.g. fast food places, bars), the centre of the Triester neighbourhood is at risk of becoming a 'food swamp'. While the future of the farmers' market, that offers fresh regional food twice a week, looks grim, there is, however, a home-delivery service established by the farmers during market operating hours. This service provides fresh farm products to long-time and well-known regular customers - mainly non-mobile elderly people from the neighbourhood, who have difficulties visiting the farmers' market. This is, however, not a regular service. Such a home delivery service could alleviate on the one hand the mobility barrier, but on the other hand, it would imply additional costs.

In the Grünanger area, there is only one supermarket at the edge of the settlement and a milk dispenser, but there is no AFN nearby. There is also a small community garden and an allotment garden colony in this area, but related food production does not play a considerable role.

In Jakomini, there are supermarkets and an organic shop as well, but from certain points in the neighbourhood distances are very long, and some busy main roads need to be crossed, which was explicitly addressed in the scope of the 'Lunch Table' workshops.

Opening hours and product variety were not taken into account in the isochrones maps, as it is obvious that supermarkets have much longer opening hours and also a much higher range of products. The limited operating hours of farmers' markets represent a significant obstacle, which was not only confirmed by representatives from the Triester and Eggenlend neighbourhood centre, but also by residents participating in the related focus group. Many people have to work during the operating hours of farmers' markets. In Graz they are usually operated between 7:00 and 12:00 AM (mainly on two days a week between Mo and Sa), and only a few markets are open during afternoons (2:00-6:00 PM). The number of stands and corresponding product variety, which loosely varies along with the number of farmers offering products, is usually higher on Fridays and Saturdays than during the week.

5.3 Belonging and Participation

Apart from farmers' markets, many AFNs are community-based, such as CSAs, food coops, community gardens and cooperative supermarkets. They mainly represent communities of choice, e.g. defined by shared values, lifestyles and trust (Exner & Schützenberger 2018, Zoll et al. 2018, Thorsøe/Kjeldsen 2016, Battisti et. al. 2022). However, we also reflected on other motives for joining such initiatives based on

explorations of good practices via literature research and interviews with key actors (Exner et al. upcoming 2023). The lowest common denominator of group formation might be pragmatism or motives for getting access to certain qualities of food at cheaper prices (Pascuccui et al. 2016), but this does not pave the way to social inclusion (e.g. Exner & Schützenberger 2018). While the value basis in relation to food procurement clarifies the common basic interest, e.g. sourcing food exclusively from certified organic agriculture, other value attitudes – with or without reference to the common basic interest in obtaining food – can significantly affect the dynamics of group formation and cohesion within these groups, ultimately impacting their ability to achieve collective goals and promote social integration.

Particularly for community based initiatives it is important to define certain organisational framework conditions, which concerns, e.g., the decision-making and the distribution of tasks. Decisions have to be taken upon different wishes and needs regarding the kind of products, ethical issues and product standards. On the one hand, there is the question of which quality criteria (should) play a role, e.g. organic, fair trade, (un)processed, animal-based food (yes/no). On the other hand, it is about how these criteria are formulated in detail, their prioritisation, and which standards are to be applied: whether certification is necessary (and which one), whether small or large-scale farms are supported, etc. At the 'Lunch Table' workshops held in the Jakomini neighbourhood centre, an illustrative example was discussed: participants' opinions differed considerably as to whether a wide range of affordable standard varieties or rather agro-biodiversity supporting rarities should be offered in a box scheme.

Producers participating in AFNs (CSAs, direct selling farmers, etc.) indicated in interviews that the consuming members mainly represent households with a higher income and educational level; e.g., the farmers' market in the Triester neighbourhood largely attracts customers from the better-off neighbouring Südtirolersiedlung. Moreover, many of the customers come from the neighbouring neighbourhoods.[108] The community gardens, which are run by neighbourhood centres, exemplify exceptions as they mainly address low-income households. However, to date they provide rather a social meeting space, and food production in terms of quantity does not play a significant role in these gardens yet.

As often described in literature and confirmed during the TDK III Workshop, many CSAs or food coops rely on voluntary work from their 'eaters', they can often only exist due to the idealism of a few people who regularly contribute their labour force on a voluntary

---

[108] A few of them also come from further distances within the city. They either used to live in the Triester neighbourhood and/or value that the market is less crowded compared to others. They come back to the neighbourhood especially and only for visiting the farmers' market. A few reported that they have moved because of the demographic change, which is driven by an increase of residents of migrant backgrounds.

basis. The willingness to actively participate varies among participants, and if not obligatory, there are also 'eaters', who remain consumers solely by just picking up their groceries. Some members are simply not interested in on-farm work, others also lack time because of other obligations (e.g. care work or long working hours), such as reported for the Park Slope Food Coop (Fourat et al. 2020), and confirmed in our stakeholder interviews. The CSA farm we investigated in Graz reported as well that they often lack community help, while other examples experience the opposite or even require a certain amount of community work per year, such as the Ortoloco cooperative in Switzerland[109]. Another strategy is to employ people for certain tasks to reduce the burden of voluntary work and/or if certain skills are needed. For instance the cooperative grocery store 'Ums Egg'[110] has an employee to guarantee certain opening hours, for self-management and to assist shoppers, e.g., with the self-service cash register (Raith et al. 2022).

A completely different group setting is given, if neighbourhood centres connect to AFNs. Their primary goal is to serve social needs, e.g. to support people in need or address loneliness. For example, residents of Jakomini use services such as the 'Lunch Table' not only to access healthy and fresh food for little money[111], but also to socialize with other people. In the Grünanger area they provide the same service as a brunch every two weeks. In the Triester and Eggenlend neighbourhood, the *Kultur.Küche* does similar and explicitly tries to attract residents with migrant backgrounds. In all these examples the social aspect (e.g. creating opportunities to meet others, combating loneliness) is highly relevant. Likewise, producers at the Triester farmers' market highlighted in the interviews that they value direct contact with their customers, and they tend to reject stationary collective solutions such as a food hub or a farmers' shop.

Considering the neighbourhood centres' assignment to support especially vulnerable groups, as well as their activities that aim to promote social inclusion, linkages to food hub facilities would be appreciated by consulted representatives. They think that this could make AFN generally more accessible, in particular for their target groups.

5.4 Food Literacy

Food literacy describes two basic aspects: on the one hand knowledge about food in general, which includes skills and know-how about how to prepare meals and process food (Truman et al. 2017), and, on the other hand, knowledge about food systems and

---

[109] https://www.ortoloco.ch/

[110] https://ums-egg.at/

[111] A weekly low-threshold community cook-and-eat event offered usually once per week by some neighbourhood centres, where only a small symbolic fee of 1-2 Euro is to be paid there. Those who join cooking eat for free. https://www.smz.at/mittagstisch/

alternative food provision options. Being food literate is supposed to empower the individual to make informed food choices (Cullen et al. 2015).

Knowledge about food and its ingredients was rated differently in our study depending on the social group. Most of the parents' survey respondents – irrespective of their socio-economic status – stated that 'health' was an important aspect of good food for them. This was the case for both schools, where the survey was carried out. However, the understanding of what exactly a 'healthy diet' meant to them, varied considerably, particularly in the relative weight given to 'meat' or else 'vegetables' as ingredients to such a healthy diet. For parents from the Triester neighbourhood meat was considered to be of greater importance in connection to 'healthy diet' compared to those from the Waldorf school. We conclude from this that the definition of a healthy diet primarily follows one's own assessment rather than official recommendations, such as those of the Austrian food pyramid.[112]

Understanding information on production about the nutritional value of products and the variety of labels is also a challenge for many people (Henderikx 2017, Sunstein 2021). The (very) importance for more transparency was stated by 50 % in the Triester neighbourhood survey, while the others consider it little important or not important at all . Wishes for transparency and simplification of product labelling were mentioned in workshops and interviews, but often only when we specifically addressed this issue.

The ability to prepare food is often linked to people's time budget and in many cases limited to simple dishes or convenience food (for the U.S.: Wolfon et al. 2019, Virudachalam et al. 2014). Our 1st street survey in the Triester district showed that more than 80 % of the respondents stated that they cook more than 3 times a week – the highest number was even 7 times, and most respondents answered that they never consume processed convenience products. Those consuming such products indicated that this would be the case up to three times a week at maximum.

Finally, when it comes to the second dimension of food literacy initially mentioned, a big obstacle for certain types of AFNs is certainly their visibility in the neighbourhood as well as the missing information about how they function. The 2nd street survey that was conducted in Eggenlend, Grünanger and the Triester neighbourhood revealed that local AFN offers were little or not at all known. Even the farmers' market in the Triester neighbourhood was not well known by residents, which is – according to our analysis – mainly due to a lack of promotional activities in general, and the use of wrong communication channels that don't reach the local residents (Janezic upcoming 2024). As knowledge about the functioning of certain types of AFN, particularly concerning CSA

---

[112]https://www.ages.at/mensch/ernaehrung-lebensmittel/ernaehrungsempfehlungen/die-oesterreichische-ernaehrungspyramide

models, is not widespread, the participants of the 'Lunch Table' workshops were quite reluctant when being asked if they would be interested in joining a CSA.

5.5 Meal culture

Regarding meal culture we refer to the cultural-ecology concept of Teherani-Krönner (2014) which tackles the cultural aspects and values of certain practices and gender roles in food production, preparation, and consumption. Her framework allows to analyse the challenges of changing food consumption trends and related developments, such as an increase in take-away, fast food, and out-of-home consumption. As already mentioned above, for our cases this aspect has not been investigated in depths so far, thus we only can reflect on some preliminary findings from interviews with farmers (in regard to food demand) and neighbourhood workers (and regard to their food related activities with their clients),

We came across aspects of meal culture at several occasions, which we would like to illustrate below by some examples.

For instance, for the planning of pilot activities that were conducted in the Triester neighbourhood, such as the *Kultur.Küche,* eating habits and preferences (incl. dietary styles), cultural and religious norms and intolerances and other health aspects needed to be taken into account. Religious norms and traditions played a crucial role, thus it was not possible to shop meat at the Triester farmers' market, since only pork is offered there, whereas a few of the invited residents only eat kosher or halal food and reject pork meat. In this case, meat needed to be shopped at a specialised butcher they trust.[113]

Another example concerns the 'Lunch Table' in the Jakomini neighbourhood centre. A vegan neighbourhood worker took over the coordination of this project and changed to meatless dishes, which took some time, but was finally accepted by the recurring visitors. Notably, this change also went along with shopping more often at the farmers' market than before.

Intolerances and allergies certainly also need to be taken into account in these projects of the neighbourhood centres, especially in Jakomini and Grünanger, since the umbrella organisation[114] is from the socio-medical field.

In the CoopsForFood project we also explored challenges and potential solutions for sustainable community catering, which could be relevant for a SuperCoop. The different demands and wishes of various eater groups as mentioned above are not only a

---

[113] In the Triester Neighbourhood, halal meat is also a precondition for many to come to festivities with (grilled) food. Ahmed (2008) emphasised trust as the central motive to buy at halal food stores over supermarkets in the UK.

[114] https://smz.at/

challenge for AFNs to supply single individuals, but this is of high relevance for community catering as well. The central community kitchen of the City of Graz[115], for example, supplies all the primary schools in Graz and also homes for the elderly. In the case of the Triester elementary school, where approx. 90% of the kids have migrant backgrounds, a wide variety of dietary needs come together. As confirmed in the interview with a representative from the central community kitchen, this ultimately represents a (manageably) challenge for procurement and the variety of dishes offered.

6 Discussion

6.1 Learnings

Our intention in developing the SuperCoop model was to address and tackle as many barriers to accessing good food as possible. Issues linked to time, space, and money, were to be solved through organisational and logistical measures. Issues related to 'softer' and broader socio-economic and cultural factors that are not within the immediate sphere of influence of an AFN need to be clearly identified and addressed in a context-specific inclusive, welcoming environment.

Regarding price, two different - and sometimes conflicting - interests need to be taken into account: sufficient/fair income for food producers (farmers, food processors and employed staff) and affordable/ cheap food for consumers. In addition, costs for logistics, which include transport facilities, storage, inventory and staff of food hubs have a clear impact on price. Therefore, scaling up an AFN, will only reduce unit costs through economies of scale when surpassing a certain threshold in size.

The transformation of food systems towards more sustainable production methods would require an internalisation of external costs (Reganold & Wachter 2016). This can be an advantage for AFN that already offer products, e.g., from organic farming, which internalise these costs. Recently, this has become obvious with the convergence of prices for organically and conventionally produced products due to soaring fossil energy prices.

Internal solidarity mechanisms can help to some extent to lower the price for low-income consumers, but we believe that better inclusion of socially disadvantaged groups also requires public subsidies. The pursuit of sustainable food policies should not only be seen in the context of food resilience but also take into account food justice. So price is not the only lever to make AFN more socially inclusive.

---

[115] https://www.graz.at/cms/beitrag/10024761/7761766/Kueche_Graz.html

Accessibility in regard to time and space (locations and distribution of AFNs, distances to be travelled) can be seen as the biggest organisational challenge for AFNs compared to traditional delivery systems, such as supermarkets. Persons with disabilities (Shaw 2006) face spatial and temporal barriers stronger than others, and this needs to be taken into account in the social inclusion practices and policies of AFNs. Participation in most AFNs is relatively difficult for people with limited time resources or who lack flexibility. Under conditions of tightly scheduled workdays and care obligations, it is difficult to do shopping at the farmers' market, for example, but time-independent pick-up points could be a welcome option.

For those, who (need to) do their grocery shopping by car (for reasons of mere physical accessibility or convenience), limited parking options, such as at the Triester farmers' market, makes shopping there unattractive. In terms of sustainable urban development, however, shopping by car may only be granted to those who depend on it. Expanding the offer of affordable mobility alternatives (e.g. cargo bike and wheel rickshaw services) and making existing options more attractive (footpaths, cycle paths, public transport) need to be considered in the context of developing socially inclusive AFN models as well.

People might also lack time and skills to prepare unprocessed food (Vidgen and Gallegos 2012), which makes AFNs, that mainly provide unprocessed food, unattractive. The knowledge on vegetable and fruit varieties is often limited to the standard range offered in supermarkets, while AFN usually put specific emphasis on the diversification of varieties, and the re-introduction of traditional old varieties.

A certain degree of convenience in terms of shopping effort and available products might therefore be necessary to make AFN more attractive.

The information currently provided by CSA farms or other AFNs about their produce and recipes to cook is too little for customers, who are not familiar with these products. The interviewed neighbourhood centres also emphasised that it would not be sufficient to give people information about food and how to prepare it. Rather, the preparation of food must be learned hands-on, and related skills need to be established step by step (e. g., in cooking workshops). Such activities are considered very useful, not only in terms of enhancing food literacy but also as a means to build social capital.

Another barrier regarding the product range is the absence of culturally appropriate products and meals. If AFNs do not offer kosher or halal food, for example, they might be unattractive for certain ethnic groups. Additionally, the absence of traditional foods from migrants' countries of origin (e.g. certain plants, including spices) might also a reason to not participate in AFNs. Community gardens in turn offer opportunities to also grow varieties favoured by migrant groups.

Against this short fall, shifting dietary styles (e.g., vegan and vegetarian) and the trend towards healthy products as well as the increase in intolerances (e.g. gluten intolerance) might suit AFNs. They could offer affordable alternatives, especially when the prices for these products were higher in the supermarkets.

Another constraint for low-income households comes along with the technicalities of storage and preparation (Shaw 2006, Teherani-Krönner 2014). For example, a larger meat package as usually offered by farms engaged in direct marketing requires appropriate cooling facilities, which are sometimes difficult to afford, especially for low-income households with small dwellings.

6.2 Implications for the SuperCoop model

We may conclude that there is not just a single cause of social exclusion in AFN, but an intersection of many dimensions. There are no simple categories like rich or poor that can be formed when it comes to increasing accessibility to AFN. The ambition of realising a SuperCoop aiming at social inclusion is thus extremely high. In this sense, we see both, some promising potential in the model, which would need to be proven through implementation and testing in practice, but also limitations.

Considering the temporal and spatial challenges of AFN, we conclude that their services need to be locally available in the neighbourhoods. The cooperation with social organisations such as neighbourhood centres was valuable for our research and we consider them important partners for the implementation of such a SuperCoop as well. At the same time, synergies can be achieved with regard to the goal of neighbourhood work to build social capital and support people in need. To increase the access to AFNs in general, and to our SuperCoop in particular, we introduced the idea of a local food hub situated and embedded in the respective neighbourhoods. The framing of these food hubs will need to be adapted to specific local needs, which also concerns organisational support and considerations about meal cultures. Instead of third parties conceptualising local food hubs for local residents, we suggest involving them in participatory processes to co-design these hubs. Equally important is the provision of tailored information that actually reaches the target groups (different channels/media, appropriate language, etc.).

In our model, food hubs can however be initiated and operated by very different (existing) institutions addressing different target groups. Besides neighbourhood centres (or with their support), food hubs could also be set up by other social organisations, schools or companies. A food coop or a cooperative grocery store with its own legal personality also could constitute a food hub. All these different arrangements of various legal and organisational settings imply different requirements and possibilities when it comes to funding, decision-making, and operational activities. Fundamentally, resource provision is a crucial point.

The SuperCoop serves as an umbrella structure (in the form of a multi-stakeholder cooperative) to link food hubs in different locations and to create the legal framework, even if certain aspects are difficult to implement due to existing regulations, such as trade licences. Hygiene standards also need to be met, which often poses challenges in practice, e.g. when trained staff is not available.

Finally, the need for economic viability applies to the SuperCoop as it does to other AFNs. This requirement carries risks and potential drawbacks in making access to good food more socially inclusive. In particular, there is a risk of segregation between 'profitable' and 'unprofitable' locations in low-income neighbourhoods, which may then have to close again. Certain organisational arrangements can be made to prevent such undesirable effects, e.g. by ensuring a certain degree of diversity within the umbrella structure and independence of the food hubs. However, the implementation of such arrangements depends not only on the availability of various resources, but also on effective solidarity between members. This would mean that the wealthier members (ideally on a voluntary basis) pay a much higher share across all food hubs than the poorer members.

7 Conclusions

We were able to identify some important factors that constitute barriers to participation in AFNs, which proves that these are not single aspects but a multi-faceted picture of what constitutes social exclusion in the context of AFNs. Consequently, an intersectional perspective on these dimensions is essential to adequately address the existing deficits.

A basic limitation of the significance of our results is that CoopsForFood was not a research project to comprehensively explore possible exclusion factors per se. Rather, it was conceived as a thought experiment on the extent to which known barriers to participation in AFNs could be addressed with different concepts of a SuperCoop. Therefore, empirical results from several projects were combined for this article, which sometimes weakened the interpretational clarity of the data.

Nevertheless, we were able to create a picture that shows the existence of something like 'AFN-food deserts' in both aspects, spatially-statistically (GIS analysis) as well as in terms of individual factors, which then are reflected in the socio-economic structures of the investigated AFNs: it is primarily socio-economically better-off people who participate.

Food supply via AFNs alone is not enough to create social inclusion, but people also need appealing offers going beyond that. Neighbourhood work offers a good anchor and community centres represent a valuable cooperation partner for this – presumably also

other social organisations and educational institutions. They can create various services for their target groups that ultimately (thesis) also could make the cooperative food provision interesting.

Socially inclusive AFNs must also take into account the diversity of food cultures prevalent among residents and offer different services. When advocating for the introduction of inclusive alternative food practices, it is important to avoid aligning them with elitist norms and morals (c.f. 'white desires', Guthman 2008). Instead of approaching the subject with the good intention of 'making good food more accessible to others', it is crucial to involve people directly in the AFN conceptualisation, especially people with migrant backgrounds or disabilities resp. their stakeholders. Persons with any attitude- and ability-related restrictions (Shaw 2006) will experience spatial and temporal barriers much stronger than others, which should also be considered in AFN related food policies. In this regard, there is still a need for further research.

8 Acknowledgements

References

Aday, S., & Aday, M. S. (2020). Impact of COVID-19 on the food supply chain. Food Quality and Safety, 4(4), 167-180.
https://academic.oup.com/fqs/article/4/4/167/5896496

Ahmed, A. (2008). Marketing of halal meat in the United Kingdom: Supermarkets versus local shops. British Food Journal, 110(7), 655-670.
https://www.emerald.com/insight/content/doi/10.1108/00070700810887149/full/html

Augustin, H. (2014). Stadt, Ernährung und soziale Ungleichheit: Zur Übertragbarkeit des food desert-Konzeptes auf den deutschen Kontext.

Battisti, S., Agarwal, N., & Brem, A. (2022). Creating new tech entrepreneurs with digital platforms: Meta-organizations for shared value in data-driven retail ecosystems. Technological Forecasting and Social Change, 175, 121392.

Bourdieu, P. 1987. Die feinen Unterschiede. Suhrkamp.

Chen, P.J., & Antonelli, M. (2020). Conceptual Models of Food Choice: Influential Factors Related to Foods, Individual Differences, and Society. Foods. 2020 Dec 18;9(12):1898.

Chepeliev, M., Maliszewska, M., & Pereira, M. F. S. E. (2023). The war in Ukraine, food security and the role for Europe. EuroChoices, 22(1), 4-13. https://onlinelibrary.wiley.com/doi/full/10.1111/1746-692X.12389

City of Graz (2019). Residents data from the Präsidialabteilung / Statistik der Stadt Graz on 1.4.2019. Retrieved from Stadtteilzentrum Triester.

Clendenning, J., Dressler, W. H., & Richards, C. (2016). Food justice or food sovereignty? Understanding the rise of urban food movements in the USA. Agriculture and Human Values, 33(1), 165-177.

Congdon, P. (2019). Obesity and urban environments. International Journal of Environmental Research and Public Health, 16(3), 464.

Cooksey-Stowers, K., Schwartz, M. B., & Brownell, K. D. (2017). Food swamps predict obesity rates better than food deserts in the United States. International journal of environmental research and public health, 14(11), 1366.

Corcoran, M. P. (2021). Beyond 'food apartheid': Civil society and the politicization of hunger in New Haven, Connecticut. Urban Agriculture & Regional Food Systems, 6(1), e20013.

Coveney, J., & O'Dwyer, L. A. (2009). Effects of mobility and location on food access. Health & place, 15(1), 45-55.

Cullen, T., Hatch, J., Martin, W., Higgins, J. W., & Sheppard, R. (2015). Food literacy: definition and framework for action. Canadian Journal of Dietetic Practice and Research, 76(3), 140-145.

Cummins, S., Flint, E., & Matthews, S. A. (2014). New neighborhood grocery store increased awareness of food access but did not alter dietary habits or obesity. Health affairs, 33(2), 283-291.

Czeglédi, A., Kopczynska, E. Peltola, T., Seppälä, T., Pózner, V., Szakál, D., David Steinwender, D., Karner, S., Kaljonen, M., Oinonen, I., Hey, M. (2023-upcoming). From the edge to the core: Participatory food environment research in European cities. STS Conference Paper.

DuPuis, E. M., & Goodman, D. (2005). Should we go "home" to eat?: toward a reflexive politics of localism. Journal of rural studies, 21(3), 359-371.

Durham, E., Baker, H., Smith, M., Moore, E. & Morgan, V. (2014): BiodivERsA Stakeholder Engagement Handbook. Best practice guidelines for stakeholder engagement in research projects. BiodivERsA, Paris (108pp).

Edwards, F. (2016): "Alternative food networks", in Thompson, P. and Kaplan, D. (Eds), Encyclopedia ofFood and Agricultural Ethics, Springer, Dordrecht, doi: 10.1007/978-94-007-6167-4_513-1.

(18) (PDF) COVID-19, local food system and digitalisation of the agri-food sector. Available from: https://www.researchgate.net/publication/364651221_COVID-19_local_food_system_and_digitalisation_of_the_agri-food_sector [accessed Jul 16 2023].

European Commission (2020): Farm to Fork Strategy. For a fair, healthy and environmentally-friendly food system. https://ec.europa.eu/food/system/files/2020-05/f2f_action-plan_2020_strategy-info_en.pdf

European Commission (2021): Food 2030 pathways for action. Partnership on safe and sustainable food systems for people, planet and climate. Food 2030 factsheet. https://ec.europa.eu/info/news/new-food-2030-factsheets-2021-jul-08_en

Everett, M., (2011). Practicing anthropology on a community-based public health coalition: lessons from HEAL. Annals of Anthropological Practice 35 (2), 10–26.

Exner, A., Schützenberger, I. (2018). Creative Natures. Community gardening, social class and city development in Vienna, Geoforum, Volume 92, p. 181-195, https://doi.org/10.1016/j.geoforum.2018.04.011.

Food and Agriculture Organization (2019). Sustainable Healthy Diets. FAO: Rome, Italy, 2019.

Fourat, E., Closson, C., Holzemer, L., & Hudon, M. (2020). Social inclusion in an alternative food network: Values, practices and tensions. Journal of Rural Studies, 76, 49-57.

Gallardo Gómez, J. (2019). Social inclusion in local food system: the role of low-income consumer in food system transitions. Master Thesis. Dr Catherine Darrot. Gent University

Goodman, D., DuPuis, E. M., & Goodman, M. K. (2012). Alternative food networks: Knowledge, practice, and politics. Routledge.

Guthman, J. (2008): Bringing good food to others: investigating the subjects of alternative food practice. In: Cultural Geographies. 15 (4), S. 431-447.

Guthman, J. (2011). The unbearable whiteness of alternative food. In Cultivating Food Justice: Race, Class, and Sustainability. MIT Press. p. 262-281.

Henderikx, F. (2017). Labelling of food: a challenge for many. Veterinarski glasnik, 71(1), 16-23. http://www.doiserbia.nb.rs/ft.aspx?id=0350-24571700001H

Herout, P. and E. Schmid. (2015). Doing, knowing, learning: Doing, knowing, learning: systematization of experiences based on the knowledge management of HORIZONT3000. Knowledge Management for Development Journal 11 (1), 64-76.

Hobbs, J. E. (2020). Food supply chains during the COVID-19 pandemic. Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie, 68(2), 171-176.https://onlinelibrary.wiley.com/doi/full/10.1111/cjag.12237?casa_token=Ji0SnP_oC0QAAAAA%3AHXp3WLIzBjoTGzqV6bXnEH1OP4JP7q1TZ4jBrImZ7y_giQKfuyE8P4AUaMuzRZW8L8FYouRB6KPiIg

Holt Giménez, E., & Shattuck, A. (2011). Food crises, food regimes and food movements: rumblings of reform or tides of transformation?. The Journal of peasant studies, 38(1), 109-144.

Holt-Giménez, E. (2011). Food security, food justice, or food sovereignty. Cultivating food justice: Race, class, and sustainability, 309-330

Horst, M., Ringstrom, E., Tyman, S., Ward, M. K., Werner, V., & Born,B. (2011). Toward a more expansive understanding of food hubs.Journal of Agriculture, Food Systems, and Community Development, 2(1), 209–225. http://dx.doi.org/10.5304/jafscd.2011.021.017

Jackson, P., & Viehoff, V. (2016). Reframing convenience food. Appetite, 98, 1-11.

Janezic, M. (upcoming 2024). Maßnahmen zur Belebung des Bauernmarktes zur Verbesserung der Nahversorgung im Triester Viertel. Bachelorarbeit zur Erlangung des akademischen Grades Bachelor of Science in der Studienrichtung Umweltsystemwissenschaften mit Fachschwerpunkt Betriebswirtschaft an der Universität Graz.

Jaravaza, D. C., & Chitando, P. (2013). The role of store location in influencing customers' store choice. Journal of Emerging Trends in Economics and Management Sciences, 4(3), 302-307.

Jaskiewicz, L., Block, D., & Chavez, N. (2016). Finding food deserts: A comparison of methods measuring spatial access to food stores. Health Promotion Practice, 17(3), 400-407.

Jarosz, L. (2008). The city in the country: Growing alternative food networks in Metropolitan areas, Journal of Rural Studies, Volume 24, Issue 3, p. 231-244, https://doi.org/10.1016/j.jrurstud.2007.10.002.

Joyner, L., Yagüe, B., Cachelin, A., & Rose, J. (2022). Farms and gardens everywhere but not a bite to eat? A critical geographic approach to food apartheid in Salt Lake City. Journal of Agriculture, Food Systems, and Community Development, 11(2), 1-22.

Langmaier, A (2023). Die Förderung der Ernährungsgerechtigkeit am Beispiel der Direktvermarktung im Grazer Triester Viertel: Möglichkeiten und Grenzen. Bachelorarbeit zur Erlangung des akademischen Grades Bachelor of Science in der Studienrichtung Umweltsystemwissenschaften mit Fachschwerpunkt Betriebswirtschaft an der Universität Graz. Betreuung: David Steinwender.

Larsen, K., & Gilliland, J. (2009). A farmers' market in a food desert: Evaluating impacts on the price and availability of healthy food. Health & place, 15(4), 1158-1162.

Levkoe, C. (2006). Learning Democracy Through Food Justice Movements March 2006Agriculture and Human Values 23(1):89-98Follow journal. DOI: 10.1007/s10460-005-5871-5

Kirwan, J., Ilbery, B., Maye, D., Carey, J. (2013). Grassroots social innovations and food localisation: an investigation of the Local Food programme in England. Global Environ. Change 23, 830–837.

Marcone, M. F., Madan, P. & Grodzinski; B. (2020). An Overview of the Sociological and Environmental Factors Influencing Eating Food Behavior in Canada. Frontiers in Nutrition. 6.

Marsden T, Hebinck P, Mathijs E (2018) Re-building food systems: embedding assemblages, infrastructures and reflexive governance for food systems transformations in Europe. Food Secur 10:1301–1309. https://doi.org/10.1007/s12571-018-0870-8

Matheson, F. I., Moineddin, R., & Glazier, R. H. (2008). The weight of place: a multilevel analysis of gender, neighborhood material deprivation, and body mass index among Canadian adults. Social science & medicine, 66(3), 675-690.

McMichael, P. (2013). Food regimes and agrarian questions. Fernwood Publishing.

Morley, A., Morgan, S., & Morgan, K. (2008). Foodhubs: The "missing middle" of the local foodinfrastructure? BRASS Centre, Cardiff University.Retrieved fromhttp://www.ngfn.org/resources/ngfn-database/knowledge/Food_HubKM0908.pdf/view

Mullins, L., Charlebois, S., Finch, E., & Music, J. (2021). Home food gardening in Hassanein, N. (2003). 'Practicing food democracy: A pragmatic politics of transformation.' Journal of Rural Studies 19(1): 77–86.

Nicolini, L., J. Milanesi. 2016. Alimentation bio: les dispositifs d'accessibilité par les prix. In: Colloque international.

Nicola, S., Ferrante, A., Cocetta, G., Bulgari, R., Nicoletto, C., Sambo, P., & Ertani, A. (2020). Food supply and urban gardening in the time of Covid-19. Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Horticulture, 77(2), 141-144.

Obersteiner, G., & Luck, S. (2020). Teller statt Tonne. Lebensmittelabfälle in Austriaischen Haushalten. Status Quo. URL: https://www.wwf.at/wp-content/cms_documents/studie_lebensmittelabfaelle-in-oesterreichischen-haushalten---status-quo.pdf

Page, S. (2021). Food matters-escaping to the garden during Covid-19 lockdowns and (re-) connecting with food (Doctoral dissertation, University of Wales Trinity Saint David, United Kingdom). https://search.proquest.com/openview/d3c7479835d23ecbd6aefcf139269c15/1?pq-origsite=gscholar&cbl=2026366&diss=y

Patel, R. (2009). Food sovereignty. The Journal of Peasant Studies, 36:3, 663-706.

Purifoy, D. M. (2014). Food policy councils: Integrating food justice and environmental justice. Duke Envtl. L. & Pol'y F., 24, 375.

Exner, A., Steinwender, D., Raith, D., Karner, S. (upcoming 2023). CoopsForFood. Diverse Economies of Sustainable Food: Von Mainstream-Alternatven zum alternatven Mainstream. Projektbericht (Project Report). https://www.ifz.at/projekt/coopsforfood/

Reganold, J. P., Wachter, J. M. (2016). Organic agriculture in the twenty-first century. Nature Plants 15221. https://doi.org/10.1038/nplants.2015.221

Reynolds, K., & Cohen, N. (2016). Beyond the kale: Urban agriculture and social justice activism in New York City (Vol. 28). University of Georgia Press.

Rose, D., Bodor, J. N., Swalm, C. M., Rice, J. C., Farley, T. A., & Hutchinson, P. L. (2009). Deserts in New Orleans? Illustrations of urban food access and implications for policy. Ann Arbor, MI: University of Michigan National Poverty Center/USDA Economic Research Service Research.

Sage, C. (2014). The transition movement and food sovereignty: From local resilience to global engagement in food system transformation. Journal of Consumer Culture, 14(2), 254-275.

Sage, C., Kropp, C., & Antoni-Komar, I. (2020, December). Grassroots initiatives in food system transformation: The role of food movements in the second 'Great Transformation'. In Food System Transformations: Social Movements, Local Economies, Collaborative Networks (p. 1). Routledge.

Shannon, J. (2014). Food deserts: Governing obesity in the neoliberal city. Progress in Human Geography, 38(2), 248-266.

Shaw, H. J. (2006). Food deserts: Towards the development of a classification. Geografiska Annaler: Series B, Human Geography, 88(2), 231-247.

Short, A., Guthman, J., Raskin, S. (2007). Food deserts, oases, or mirages? Small markets and community food security in the San Francisco Bay area. Journal of Planning Education and Research 26 (3), 352–364.

Sonnino R, Marsden T (2006) Beyond the divide: rethinking relationships between alternative and conventional food networks in Europe. J Econ Geogr 6:181–199. https://doi.org/10.1093/jeg/lbi006

Sunstein, C. R. (2021). Are food labels good?. Food Policy, 99, 101984. https://www.sciencedirect.com/science/article/pii/S0306919220301883?casa_token=hYCaCBBwwvAAAAAA:2NRaiBEUYo27Rdv-d07_1V6oIpfn1yM2xHHB058oe6jha9iS007lU4u5HmabKwS2xyT9EXPgmFc

Teherani-Krönner, P. (2014). Mahlzeitenpolitik. Mahlzeitensicherheit und Mahlzeitenkultur. In: Mahlzeitenpolitik: Zur Kulturökologie von Ernährung und Gender. Herausgegeben von P. Teherani-Krönner, B. Hamburger. oekom verlag. 17–50.

Thilmany, D., Canales, E., Low, S. A., & Boys, K. (2021). Local food supply chain dynamics and resilience during COVID-19. Applied Economic Perspectives and Policy, 43(1), 86-104. https://onlinelibrary.wiley.com/doi/full/10.1002/aepp.13121?casa_token=iv1ogDMYBQgAAAAA%3AjakNFukyhlQAY_J-YvzJq8iFjL3OJ2KAA_wLEhDgSSpwy_PViV6OlNydy4EpUOiI3gCB3TPNIbbXfg

Thorsøe, M., & Kjeldsen, C. (2016). The constitution of trust: Function, configuration and generation of trust in alternative food networks. Sociologia Ruralis, 56(2), 157-175.https://onlinelibrary.wiley.com/doi/full/10.1111/soru.12082?casa_token=UicVtCNNU5sAAAAA%3AnBySu67S-B_Z_hc6V3n1nwWexJg7U5MFlhJ2ENnqzI8mzle936_K6j-zUYwkvHlvt9uPi_U8iMCTWpfw

Tornaghi, C. (2017). Urban agriculture in the food-disabling city:(Re) defining urban food justice, reimagining a politics of empowerment. Antipode, 49(3), 781-801.

Truman, E., Lane, D., & Elliott, C. (2017). Defining food literacy: A scoping review. Appetite, 116, 365-371.

United Nations (2021). Global Report on Food Crisis. Joint analysis for better decisions elaborated by the Global Network Against Food Crisis and the Food Security Information Network. https://www.wfp.org/publications/global-report-food-crises-2021

Ver Ploeg, M., Dutko, P., & Breneman, V. (2015). Measuring food access and food deserts for policy purposes. Applied Economic Perspectives and Policy, 37(2), 205-225.https://onlinelibrary.wiley.com/doi/full/10.1093/aepp/ppu035?casa_token=WgAw PKKmBgIAAAAA%3AqpoJg7BL6Q5iKAl1NZwY8BkMASkqzu4U57qrXv9ZpOxBOck ySRjfUDvSLpDqUN2TixX3075F8XjXXQi-

Vidgen, H. A., & Gallegos, D. (2014). Defining food literacy and its components. Appetite, 76, 50-59.

Virudachalam, S., Long, J. A., Harhay, M. O., Polsky, D. E., & Feudtner, C. (2014). Prevalence and patterns of cooking dinner at home in the USA: National Health and Nutrition Examination Survey (NHANES) 2007–2008. Public health nutrition, 17(5), 1022-1030. https://www.cambridge.org/core/journals/public-health-nutrition/article/prevalence-and-patterns-of-cooking-dinner-at-home-in-the-usa-national-health-and-nutrition-examination-survey-nhanes-20072008/56FAF38A1200B8B90AB23864B03D11A2

Wang, H., Qiu, F., & Swallow, B. (2014). Can community gardens and farmers' markets relieve food desert problems? A study of Edmonton, Canada. Applied Geography, 55, 127-137.

Wang, H., & Qiu, F. (2016). Fresh food access revisited. Cities, 51, 64-73.

Wang, H., Tao, L., Qiu, F., & Lu, W. (2016). The role of socio-economic status and spatial effects on fresh food access: Two case studies in Canada. Applied Geography, 67, 27-38.

Winter, M. (2003). Embeddedness, the new food economy and defensive localism. Journal of rural studies, 19(1), 23-32.

Wolfson, J. A., Ramsing, R., Richardson, C. R., & Palmer, A. (2019). Barriers to healthy food access: Associations with household income and cooking behavior. Preventive medicine reports, 13, 298-305. https://www.sciencedirect.com/science/article/pii/S2211335519300142

Zoll, F., Specht, K., Opitz, I., Siebert, R., Piorr, A., & Zasada, I. (2018). Individual choice or collective action? Exploring consumer motives for participating in alternative food networks. International Journal of Consumer Studies, 42(1), 101-110. https://onlinelibrary.wiley.com/doi/full/10.1111/ijcs.12405