Gender+ in nanotechnology. A practical experience.

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Abstract. The experience described refers to an EU-funded research and innovation project on nanotechnology, REusable MAsk Patterning, (REMAP), financed by the European Commission PathFinder Open programme and aimed at formulating a novel class of bifunctional composite fluids called magnetorheological electrolytes. The inclusion of a gender+ perspective in the research project is not obvious given the research areas investigated in the project and the hypotheses to be tested. However, even if the initial technological readiness level (TRL) of the research is low, this research is ultimately expected to have a disruptive impact on society. It is therefore crucial that the relevant hypotheses and methods are free of gender bias from the outset. The inclusive Gender Equality Plan of the University of Genoa, Italy, implements a group of activities at project level, the Project Gender+ Action Plan (P-GAP), which integrates gender+ in the work plan of R&I projects and tries to fulfil the EU requirement to include a gender+ perspective in all phases of research. Therefore, REMAP foresees the implementation of several micro-actions that also relate to the project's dissemination and outreach activities.
The initiative aims to overcome the resistance to the implementation of a gender+ perspective in STEM disciplines and to create a fruitful and positive cross-fertilisation between STEM and social sciences, especially gender and diversity studies.
The next step is to consolidate this initiative at local level and through collaboration with other EU-funded projects.

1. Introduction

In 2021, Horizon Europe (HE) made gender equality plans (GEP) or equivalent strategies mandatory for public organisations to apply for funding. However, the 2022 HE calls for proposals recognised the heterogeneity in the implementation of GEPs across the EU and the persisting structural barriers in research and innovation institutions (i.e. HE

Framework Programme, WIDERA call, 2022) requiring the Higher Education Institutions (HEI) to adopt an inclusive perspective in their GEPs. This paper is firmly based on the idea that, in order to address these challenges, HEIs should propose inclusive GEPs that are in line with the priorities of the new European Research Area (ERA) and gender equality objectives (Addabbo *et al.,* 2021).

The GEP of the University of Genoa, Italy, is implementing three transversal pilot actions, at department, project, and curriculum levels, focused on promoting inclusivity in research and teaching activities. In our contribution, we focus on the action at project level, the Gender+ Action Plan (P-GAP), which is based on the requirements of the EU FP6 (2002-2006) (Kalpazidou Schmidt *et al.,* 2020) and integrates gender+ into the work plan of R&I projects to fulfil the EU requirement to include a gender+ perspective in all phases of research, i.e. problem identification, conceptualisation, research, data collection and analysis, dissemination and follow-up (Bencivenga *et al*., 2022).

It is perhaps not superfluous to clarify that by adopting a Gender+ strategy, the interactions of gender with other sources of inequality and grounds of discrimination are taken into account. The term “gender+” (gender plus) was first used in the European research project Quality in Gender+ Equality Policies in Europe, QUING, 2006-2011 (Krizsan *et al.*, 2012). It was originally coined by Mieke Verloo, the scientific director of the project, and has become established in many areas.

The experience described here relates to an EU-funded research and innovation project on nanotechnology, REusable MAsk Patterning, (REMAP), which was funded by the European Commission's Pathfinder Open programme under grant agreement No. 101046909. Among the researchers working for the project coordinator, those working on organic, physical and inorganic chemistry will be supported and advised in their activities by a team of experts in Gender+ and Equality, Diversity and Inclusion (EDI) studies, with the aim of integrating strategies and activities related to Gender+ into the project and adding a transdisciplinary dimension.

The paper is organised as follows: we start describing the societal readiness level (SRL), a scale that assesses the degree of societal adaptation for a given social project, technology, product, process, intervention or innovation (social or technical) to be integrated into society. SRL is one of the concepts chosen as the basis for the REMAP pilot initiative. Next, we summarise the current state of the art in relation to Gender+ and EDI in chemistry, particularly in nanotechnology. We then describe the process that led to the activities carried out within the REMAP project and give a brief description of the activities related to the dissemination and outreach aspects of the proposal. Finally, we summarise the theoretical and empirical implications, outline the limitations of the approach and suggest further ways to formalise the content in the project methodology and in a consistent manner throughout the proposal.

2. Societal Readiness Level

In planning the Project Gender Action plan and the actions to be implemented in projects like REMAP, we were guided by a theoretical reflection on the concept of Societal Readiness Level ((Innovation Fund Denmark, 2019; Leone *et al*., 2024). As the SRL is strictly related to the Technology Readiness Level, we will describe both scales.

When considering the maturity level of a research result or an innovation product, we are asked to place it on a fixed scale of values, also used by the European Commission, which aims to measure the maturity level of a technology, particularly in comparison to its introduction into the production system and ultimately into the market.

One of the first introductions of this concept was its use in National Aeronautics and Space Administration planning (Mankins, 1995), where the scale was first established and then further developed in its terminology so that it extended to other technological areas. The Technology Readiness Level (TRL) now ranges from 1 to 9 and depends on how far research has progressed in relation to our subject matter and how complete the path to market and large-scale production is.

This scale is used today by the European Commission for example in the Horizon Europe calls for proposals for research and innovation projects. It asks applicants to position the research and/or their product in a specific TRL range that meets the Commission's expectations.

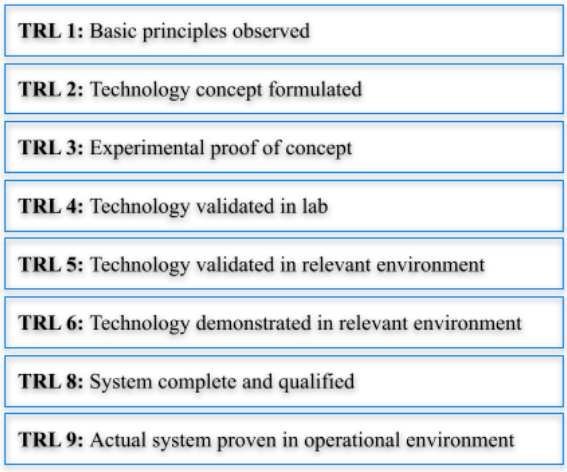

Figure 9. The EC Technology Readiness Levels (TRL) scale (Yfanti, Sakkas, 2024, p. 2).

In the case of an innovation that uses the TRL scale as a reference, it is crucial to ensure that the corresponding hypotheses and methods are free of gender+ biases from the outset and that the technological product/object we are dealing with is socially acceptable and accepted (Sella *et al*., 2024), i.e. it is also “ready” in social terms. This denotes that technology cannot function as the sole means of introducing innovation into our societies. Rather, consideration must be given to how technology can be reconciled with, for

example, ethical judgements, societal values, expectations of special needs, gender+ approaches, inclusivity and others (Bernstein *et al.*, 2022).

While the TRL model provides a valuable basis for assessing technological maturity, it may need to be adapted and supplemented to fully capture the complexity of innovation developments and to guide effective innovation and its application. We also aim to overcome the limitations of the TRL model while improving its application by exploring new avenues of innovation and social innovation (Leone *et al*.,, 2024).

In order to fulfil the requirements of social acceptance and compliance with the social values of innovation, a new scale has recently been introduced to measure the level of readiness. It is the Societal Readiness Level (SRL), a scale that reverses the so-called classical approach to technology and offers a completely different measurement of the technology object being observed.

The SRL scale was originally introduced by the Innovation Fund Denmark, the main public fund for low-interest financing of research and innovation projects by private companies and public knowledge institutions. The fund also invests in research and development projects aimed at solving societal problems. The scale is meant to assess the degree of social acceptance of a particular technology, product, process or measure. The underlying concept is that any innovation, whether technical or social, must be integrated into the social environment. In fact, the results of Innovation Fund Denmark must also be evaluated in terms of improving social well-being, increasing societal welfare, creating jobs, reducing CO2 emissions, a cleaner environment, etc. Thus, a higher SRL value indicates better integration both in terms of societal structures and social interactions, reducing the need for ad hoc measures to achieve a real and convincing shift at both levels (Innovation Fund Denmark, 2019). It is a paradigm shift that calls on scientists, researchers and innovators to shift their perspective from the purely technological and technical levels to embedding the societal and social values of the object of study or innovation. This can be applied to all areas and domains, as also defined by the Danish government:

> Societal Readiness Level (SRL) is a way of assessing the level of societal adaptation of, for instance, a particular social project, a technology, a product, a process, an intervention, or an innovation (whether social or technical) to be integrated into society. If the societal readiness for the social or technical solution is expected to be low, suggestions for a realistic transition towards societal adaptation are required. Naturally, the lower the societal adaptation is, the better the plan for transition must be. (Innovation Fund Denmark, 2019, p.1)

Parallel to the TRL scale, the SRL scale is divided into 9 different levels:

MATURITY LEVEL	DESCRIPTION
SRL1	Identification of the generic societal need and associated readiness aspects
SRL2	Formulation of proposed solution concept and potential impacts; appraisal of societal readiness issues; identification of relevant stakeholders for the development of the solution
SRL3	Initial sharing of the proposed solution with relevant stakeholders (e.g. through visual mock-ups): a limited group of the society knows the solution or similar initiatives
SRL4	Solution validated through pilot testing in controlled environments to substantiate proposed impacts and societal readiness: a limited group of the society tests the solution or similar initiatives
SRL5	Solution validated through pilot testing in real or realistic environments and by relevant stakeholders: the society knows the solution or similar initiatives but is not aware of their benefits
SRL6	Solution demonstrated in real world environments and in co-operation with relevant stakeholders to gain feedback on potential impacts: the society knows the solution or similar initiatives and awareness of their benefits increases
SRL7	Refinement of the solution and, if needed, retesting in real world environments with relevant stakeholders: the society is completely aware of the solution's benefits, a part of the society starts to adopt similar solutions
SRL8	Targeted solution, as well as a plan for societal adaptation, complete and qualified; society is ready to adopt the solution and have used similar solutions on the market
SRL9	Actual solution proven in relevant societal environments after launch on the market; the society is using the solution available on the market

Figure 2. SRL scale (Bruno et al., 2020 p. 5, adapted from Innovation Fund Denmark)

Regarding our specific focus on gender+, it should be noted that gender bias can manifest as unintentional errors in research conceptualisation and design, execution, understanding and validation of research findings, from theory to experiment (European Commission, 2020). Aside from the ethical implications, by adopting the SRL scale, eliminating these biases can 1) bring long-term economic benefits by improving the market base and commercial attractiveness of the technology developed; 2) lead to more integral and complete research and scientific results; 3) help develop better products that are more acceptable to end users.

This unbiased approach to innovation would also avoid production errors in which new products or innovations are brought to market without taking into account the actual needs or expectations of end consumers or simply ignoring them (Coughlin, 2017). While gender discrimination remains an important issue, the neglect of other forms of discrimination in the context of innovation reveals a significant gap in our understanding of inclusivity. For example, there are clear examples of how ageing is not adequately considered in discussions about innovation, despite older adults being a rapidly growing population group in Western societies. In a market where older adults are often portrayed

as unsympathetic and overly stereotyped, this omission highlights the importance of addressing ageism alongside gender discrimination. As a matter of fact, nowadays “just 31 percent of companies take global ageing into account in their market sales plans”, in a market where “older adults […] find their contemporaries’ portrayal unappealing and overly stereotypical” (Coughlin, 2017, p. 9).

Other typical examples of how research and scientific innovation should be inclusive to avoid mistakes are some examples given in the first edition of the report Gendered Innovations (European Commission, 2013). They show how wrong hypotheses have led to wrong treatments or interventions that have been corrected by recent research from a gender perspective. For instance, knee replacements should not be determined by gender, but by weight and height differences; ischaemic heart disease is not a predominantly male disease; osteoporosis is not a disease that only affects women, and so on. The more recent edition of Gendered Innovations (Schiebinger and Klinge, 2020) also shows how different inclusive approaches in the same areas can lead to broader outcomes, improvements or efficiencies, for example in transport, energy use and efficiency, chronic pain management and others.

As for the gender dimension in particular,

> Technology is an extremely significant site of gender negotiations in relation to occupations, symbols, and identities, and gender in all these areas has an extremely significant shaping influence on the design and use of technologies (Lohan and Faulkner, 2004, p. 319).

Without due consideration of gender in the conception and design phases, the societal adoption of R&I results would ultimately fail. A very well-known case of failure due to gender aspects being misjudged or underestimated is, for example, the failure of Dell, which tried to launch a pink laptop in 2009 because it thought women would like it – but they did not. A similar failure was that of Honda in 2013, who tried to launch a car solely intended for women, thus repeating the analogous failure of the US company Dodge some sixty years earlier (Coughlin, 2017, p. 109).

To avoid biases and make progress towards inclusion, SRL and TRL should engage in dialogue. Indeed, the impact that the tenacious and fruitful dialogue between SSH and STEM disciplines can have at scientific, economic, and societal levels has been recognised by the European Commission since Horizon 2020, and demanded to all applicants. Multi- and interdisciplinary approaches have become mandatory in recent years, and therefore all researchers and scientists should be interested in such cross-fertilisation and constant dialogue, which has ancient roots (Snow, 1969).

In summary, by refocusing scientific activity in research and innovation on a technological and societal readiness level approach, we can better develop the idea of democratising innovation that was born at the beginning of this century (von Hippel, 2005), when

innovation was overwhelming our societies and it seemed to many that it was no longer people-centred. So if we use TRL and SRL together, we can truly claim that “innovator and consumer are one and the same” (Coughlin, 2017, p. 120) and that great progress can emerge from the dialogue between different disciplines.

3. Gender+ in chemistry and nanotechnology

As the REMAP project relates to nanotechnology, it is important to give a brief overview of the progress that has been made within the discipline with regard to the integration of gender+ perspectives. Nanotechnologies represent an area where the implementation of the gender+ dimension may seem particularly difficult, resulting in a high risk of "nano-divide" that reinforces inequalities (Cozzens, 2010; The Royal Society, 2004). The potential economic and social benefits of nanotechnologies could be compromised if these technologies contribute negatively to stigmatisation and discrimination (UNESCO, 2014).

In general, EU initiatives that promote gender equality and progressively integrate inclusion as a pervasive dimension have adopted three analytical approaches to issues in science and technology research, focussing on i) balanced representation, ii) institutional change and iii) the adoption of gendered perspectives in the research process. These analytical approaches have been applied in successive phases, but all three remain important as the results obtained for each separate approach may be considered conclusive (Schiebinger, 2000, 2014). This is all the more true when considering, in addition to gender imbalances, imbalances in relation to other groups that are underrepresented in the scientific community due to their ethnicity, sexual orientation, the presence of disabilities or other factors.

The first analytical approach, known as "Fixing the Numbers"," focuses on the inclusion of women and other underrepresented groups in research and innovation and in decision-making positions. This includes, for example, introducing gender quotas for evaluation committees and expert groups and setting a target of 40% for the underrepresented gender in advisory groups and committees (Caprile *et al.*, 2022).

The second analytical approach, which Schiebinger defines as “Fixing the Institutions”, promotes inclusive gender equality in research and innovation careers by stimulating changes in policies, practises and, more broadly, in the culture of research institutions. This approach focuses on increasing the participation of women and underrepresented groups in research at all levels, including career development.

The literature in the chemistry field has been addressing the need to "fix the numbers" and "fix the institutions" by reflecting on possible discrepancies in individual performance (Reinhold, 2007) or by highlighting positive results achieved by female scientists (Meng, 2018).

More recently, research targeting the application of nanomaterials has developed an awareness of the importance of adding a gender dimension to innovation (Yang *et al*., 2021). This is leading to the third analytical approach, referred to as "Fix the Knowledge", which addresses the need to eliminate gender bias in the production and dissemination of scientific knowledge and to promote excellence in science and technology by integrating gender and intersectional analyses into research. Originally, this included recognising the contributions of women scientists to science and the need to develop gender-sensitive research methods and practices (Tannenbaum *et al.*, 2019), but this requirement now also extends to other underrepresented groups.

Although some progress is made, there is still a lack of good practice that should be followed when conducting EU-funded research. However, progress is made thanks to the EC initiatives. Horizon Europe emphasises how important it has become to take the gender+ dimension into account in all scientific fields and in the production of innovation. To better implement these requirements, the European Union recommends utilising the resources available through the Gendered Innovations initiative (Schiebinger, 2008), such as the website www.genderedinnovations.eu and the associated reports and articles. Gendered Innovations provides the research community with tools and guidelines to integrate the analysis of sex and gender into their research. The policy review “Gendered Innovations: How Inclusive Analysis Contributes to Research and Innovation” published by the European Commission (EC) (European Commission, 2020), which has resulted in a series of actions to promote equality, diversity, inclusion and gender+ in all projects funded by the European Commission, clearly states that:

> Integrating sex and gender analysis into research and innovation adds value to research and is therefore crucial to secure Europe’s leadership in science and technology, and to support its inclusive growth (European Commission, 2020, p.7).

Notwithstanding the fact that there is still a long way to go, it can be said from the authors' experience that the European Commission tends to take better account of the gender+ dimension in research. In fact, all scientific fields should take gender and inclusion into account when preparing a project proposal for the EU (unless explicitly mentioned in the call). For example, in Criterion 1 (Excellence), reviewers assessing projects submitted to Horizon Europe calls also evaluate whether the consideration of the gender dimension in research and innovation is duly addressed.

4. Gender+ in a fundamental research project: the REMAP project

We now describe some of the experiences made within the framework of REMAP, a R&I project funded by a call to foster bottom-up avant-garde disruptive innovations, the Pathfinder Open funding scheme of the European Innovation Council (EIC). The scheme is part of the Ninth European Framework Programme for Research and Innovation (Horizon Europe) and aims to support deep-tech projects with a high level of scientific and technological ambition and risk with grants of up to four million euros.

The EIC Pathfinder Open supports research teams seeking the scientific basis to underpin breakthrough technologies. It supports the early stages of scientific research to explore deeply innovative directions with a technological impact that can transform sectors and markets or create new opportunities. Indeed, the programme focuses on the implementation of innovative technological solutions to identify, develop and support breakthrough innovations across Europe.

The inclusion of a gender+ perspective in the research project is not easy in view of the research areas investigated in the project (magnetism, click-chemistry, electrodeposition, photovoltaic devices) and the hypotheses to be tested. It is well known that the gender dimension has been neglected for many years in some specific areas of interest here (Pollitzer, 2021). Nevertheless, even if the initial technology readiness level (TRL) (Mankins, 1995) of the research is low, a disruptive impact on society is ultimately expected from this kind of actions when they elapse. Therefore, it is crucial to ensure that the relevant hypotheses and methods are gender unbiased from the very outset.

Gender bias may include unintentional flaws in the research design, implementation, interpretation of the results, and validation of prototypes all the way from theory to experiments, or it can relate to the knowledge production cycle, where “consequently, ‘male’ as the norm came to dominate science knowledge-making, explicitly by excluding females as research subjects, and implicitly by not analysing and not reporting results disaggregated by sex, where male are dominating the knowledge-production” (Pollitzer, 2021, p.656).

Besides the most obvious ethical implications, careful assessments can bring longterm economic benefits through the value added in terms of expanded market base and commercial appeal of the sought technology. In order to prevent the emergence of gender bias in the research content, it is necessary to reflect on the perspective that has emerged since the 2000s in Gender and Technology studies, which views technology and gender as socially co-constructed in a reciprocal shaping process (Lohan and Faulkner, 2004).

The P-GAP initiative, a pilot experience in the GEP of the University of (UniGE), Italy, allowed to establish a positive interdisciplinary co-operation between the researchers writing the proposal and experts in gender and EDI studies. The evaluation included the "right-to-react procedure", that follows directly after the individual evaluation executed by experts. The applicants get a limited amount of time to respond to the comments drafted by the experts during the individual evaluation phase. The aim is to provide a more detailed feedback to the applicants in an early phase of the evaluation procedure to increase accountability. The coordinator of the REMAP proposal, who is co-author of this article, received a list of comments from the evaluation panel covering different topics related to the scientific premises, the foreseen technological and societal impact, and the methodologies, including the gender approach. The response to the evaluators' comments had to be submitted within five days from the receipt of the comments and could not exceed two pages.

A question related to gender was about the planned research activities and their gender-specific dimension from a biological, social and cultural perspective. The reviewers found that the gender dimension considered in the proposal was not related to the planned research activities but, on the contrary, lagged behind them and asked for further clarifications. With the support of gender studies experts at the university, who are co-authors of this article, the coordinator prepared an answer that was accepted and contributed to the funding of the project. The reply stated that the research topics of REMAP, which concern ferrofluid, magnetorheology, etc., cannot include a sex/gender approach. On the other hand, REMAP would produce a policy report paper (in the form of a deliverable) addressed to the European Commission, among others, as a result of communication activities at science festivals and other communication and dissemination events, where the gender dimension could be observed and influenced. In this context, the project would carry out surveys in accordance with the EIC Work Programme 2021, taking into account gender-specific and other variables among participants. Furthermore, the coordinator reiterated that the gender dimension would be closely linked to REMAP research activities: in line with EU best practices for inclusive innovation, the dedicated gender studies experts would support the partnership in promoting gender+ balance and equal opportunities during activities and events, gender-neutral language in dissemination and communication. Foremost, the REMAP consortium would address the gender dimension as a moral obligation in line with the United Nations SDG No. 5, Gender Equality.

Another comment from the reviewers pointed to specialists in fields traditionally distant from STEM disciplines, such as economics, politics, gender studies, as not strictly required to achieve the proposed breakthrough, even though such specialists were included in the teams since its start. Also in this case, the answer was deemed satisfactory, and confirmed that – with a holistic approach - the REMAP breakthrough

would only succeed if the technology would have a major impact on science, economy and society – the project's goal no. 4 - in the long term. Whereas the scientific breakthrough can be achieved without the disciplines of social sciences and humanities (SSH), the involvement of SSH experts (which accounted for about 8% of person-months) was deemed crucial to achieve the targeted economic and societal impact as included in criterion 2 (Impact) of the project proposal. Indeed, the implementation of REMAP would include specific programmes to accelerate training. In this case, the proposed actions would empower young or early-stage researchers with a high potential for translating research into innovation.

An assessment of the economic sustainability of commercial exploitation was also envisaged, thus integrating competences in the economic, business and political fields. Furthermore, it was evidenced that the participation of research experts in gender studies would show that REMAP's attention to the gender dimension is not mere "purple and/or pink washing", but on the contrary a commitment to excellence, creativity and entrepreneurship.

5. Dissemination and outreach activities

In order to promote a gender+ perspective, REMAP foresees the implementation of several micro-actions, of which we will focus in this presentation on the communication, dissemination and outreach activities of the project.

Communication, dissemination and outreach activities are particularly important as they can be an important catalyst for promoting an inclusive culture and introducing relatively new concepts such as the gender+ perspective. Below, we present some of the strategies and suggestions made in the first phases of the project.

5.1. Dissemination activities

REMAP included lists of journals and conferences identified for the scientific dissemination of the project, as well as the list of resources for communication (from the website to various social media and networks), which helped identify a series of suggestions for the partners.

A bibliographic search in various scientific journals related to chemistry and nanotechnologies mentioned in the proposal allowed the identification of a number of articles published in the last three years that are in some way related to gender. This activity aims to provide partners with up-to-date references that can serve as a basis for knowledge acquisition and the expansion of the project network to include individuals and research groups that pay attention to gender balance, diversity and the adoption of

a gender perspective. For example, based on the editorial by Lojou et al. (2021), access was provided to a special issue on the presence of women in chemistry.

Another valuable resource was the EU's CORDIS database, where it was possible to identify projects related to nanotechnologies that contained specific references to gender and/or diversity. Again, for reasons of space, we will limit ourselves to mentioning only one source. Three white papers, published a few years ago but still considered valid, offer suggestions for the implementation of RRI (Responsible Research and Innovation) conditions in nanotechnology research and innovation (Bechtold, Fuchs and Borrmann, 2020).

White Paper 1 explores the opportunities and drawbacks of using co-creation as a tool to enhance the responsiveness of nanotechnology research and innovation to societal needs and values. The first white paper highlights the findings from the GoNano co-creation process and suggests five rules of thumb for prospective co-creation practitioners. It is mainly targeted at researchers, engineers and other stakeholders involved in research and innovation.

White Paper 2 provides insights on how to implement co-creation, considering research as well as the innovation ecosystem. It addresses industrial and business partners, research institutions, and policy makers involved in research and innovation.

White Paper 3 provides guidance on how to realise co-creation in the light of a gender and diversity perspective in order to better integrate these perspectives into nano-related research and innovation. The main addressees of the third paper are process organisers and/or researchers in a position to put co-creation into practice.

Regarding the communication of the project activities, some recommendations were included in the communication, dissemination and exploitation plan presented in the third month of the project. In particular, the importance of adopting the following suggestions as far as possible was emphasised.

- Remind in the deliverables and outputs that EU funding can also contribute to promoting equality, diversity and inclusion and gendering the research pathway in a gender+ perspective, mentioning EU strategies where appropriate.

- To ensure gender+ balance, it is important to monitor the composition of advisory boards, committees and working groups involved in the project. This includes determining the inclusion of scientists of all genders and emphasising the benefits of research for individuals regardless of their gender.

- Training on gender+ and aspects of equality, diversity and inclusion relevant to project activities should be included to raise awareness and promote an inclusive research environment.

- To evaluate the effectiveness of gender equality measures, it is also important to select and introduce key performance indicators (KPIs). These KPIs should be tailored to track and evaluate the impact of gender equality measures within the project in order to measure progress and identify areas for improvement.

5.2. Participation in science festivals

For outreach activities, given the partners' participation in a number of science festivals in different partner countries of the project, a special training session was organised to illustrate a range of strategies to promote accessibility and inclusion from the planning phase to participation and data collection. Partners can adapt the list to their specific circumstances by deleting inapplicable suggestions and adding others, thanks to the appropriation of general principles applicable to different social, geographical and cultural contexts. Note that these suggestions do not include elements already formally adopted by project partners, such as accessibility criteria for visually impaired individuals or physical accessibility of spaces where events are held.

As a first step, it is recommended to establish a code of conduct that promotes respect, inclusivity and non-discrimination. Publish it at all stages, from initial planning to all advisors and organisers with whom researchers interact and collaborate, and distribute it to participants. It is important to provide clear and easily accessible information to enable feedback to be submitted.

A list of recommendations on various aspects that are typical of science festivals and other initiatives aimed at the general public has been discussed with the researchers. The different aspects were divided into the following macro-areas: a) contents, also paying attention to the diversity of speakers, including in terms of background; b) venue and organisation, provision of accessible venues from different points of view, for people with different disabilities or other needs, e.g. left-spot childcare; c) language(s) so that inclusion, accessibility and different cultural backgrounds are welcome; d) inclusion of underrepresented communities and potential stakeholders; e) the last but perhaps most important advice is to publicise all of the above in traditional media, social media, networks, project and university websites, etc.

The above mentioned initiatives and others related to other workpackages have been at the centre of information and training events since the project's kick-off event and are updated at each regular meeting. The aim is to help researchers create roadmaps that integrate the theoretical aspects of the project, the technologies developed and their future applications into a narrative that takes into account the gender+ dimension at all stages of the project, including impact and future technological uptake.

We are aware that embedding the gender+ dimension in research planning and implementation remains an open question, especially in the scientific fields analysed here, although such a dimension is crucial in all phases of scientific production from the very outset (Soldin *et al.*, 2011) or when the gender perspective is necessary for a better research outcome (Romero-Perales *et al.*, 2023).

6. Conclusions

Despite the limited space that prevents a comprehensive overview of the numerous activities organised within the project REMAP — most of which are transferable to other EU-funded research activities — we hope that the above illustrates how the initiative described aims to overcome resistance to the implementation of a gender+ perspective in STEM disciplines and to create a fruitful and positive cross-fertilisation between STEM and social sciences, in particular gender and diversity studies.

The concept of SRL was the most relevant framework for considering how to promote gender+ in a fundamental research and innovation project. Whereas STEM scientists are used to considering the TRL of their research activities, integrating a social perspective can prove difficult without the support of experts in SSH. The aim is to provide researchers with medium- to long-term perspectives, resources and strategies that will be useful in the future to implement the gender+ perspective in all phases of research, as required by Horizon Europe.

Indeed, it can be observed that SSH are often far from an application-oriented field, and it is difficult to involve such disciplines in research projects dealing with technology or technical progress. In the case of the initiative we are presenting, the P-GAP and its application to the REMAP project, it is becoming increasingly clear how helpful positive collaboration and exchange between different disciplines can be, and that this makes the result leading to innovation completer and more comprehensive. At the same time, SSH scientists can take inspiration from this successful example and unleash an open dialogue with the STEM fields.

The limitations of the initiative are that it is not yet widespread and, therefore, it needs fine-tuning to become applicable on a larger scale. Other ways to formalise the experience are related to the importance of the ground-up approach. This approach consists of providing information, training and support material to a number of researchers who are part of a consortium, which they can apply in the development of other proposals, from the concept phase, in which the problem is identified, through the design of the research, collection and analysis of data, to the communication, dissemination and exploitation phasesanalysis of data, to the communication, dissemination and exploitation phase.

The next steps are to consolidate the P-GAP through co-operation with other EU-funded projects and to extend it to all scientific fields. A useful resource in this sense is the possibility of disseminating the competences acquired in the Ulysseus University Alliance, to which the coordinating partner belongs. Within Ulysseus, the eight partners are working on a work package dedicated to the promotion of EDI in the activities of the alliance. This includes a comparison and harmonisation of the partners' GEPs, where UniGe's idea of a P-GAP can be tested and implemented in other universities.

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