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192 EURECA-PRO, The European University on Responsible Consumption and Production: An Alliance for Sustainability

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Abstract

In recent years, the implementation of sustainability has gained importance in all areas of global societal development as science has proven that climate change is a human induced and inevitable future circumstance if nothing is done to avert it. With strategies and frameworks such as the UN Sustainable Development Goals and the EU Green Deal, it has become clear which direction research and education will take in the future, towards an interdisciplinary and excellence-based approach to systemically solve today's societal challenges for a better ecological and social future. Innovation, education, research and societal cooperation, known as the knowledge square, are key factors in reaching these goals. The framework of the European Universities offers an opportunity that can integrate all these factors, in promoting cooperation across borders, languages, and disciplines thereby being an ideal vehicle to address societal challenges of our time and related skills and knowledge shortages faced in Europe.Within the ERASMUS+ and H2020 Framework Programmed seven higher education institutions located in six different EU member states, namely Montanuniversität Leoben (Austria), Technische Universitaet Bergakademie Freiberg (Germany), University of Petrosani (Romania), University of León (Spain), Technical University of Crete (Greece), Silesian University of Technology (Poland) and Mittweida University of Applied Sciences (Germany) joined forces and created a strong and unique European University in the field of Responsible Consumption and Production as defined in Sustainable Development Goal 12 of the United Nations: **EURECA-PRO** – The **E**uropean **U**niversity on **RE**sponsible **C**onsumption **A**nd **PRO**duction. Its mission is a two-fold one: on the one hand, it aims at contributing creatively to the European Higher Education Transformation Agenda to stimulate seamless education and cooperation within Europe. On the other hand, it aims at becoming the European core excellence hub for responsible consumption and production converging all European and global activities, be it scientific, industrial or social, as well as all stakeholders in this field. Since Fall 2020 the consortium works on its goal to ultimately create a research and education agenda that systemically integrates all necessary interdisciplinary knowledge (technological, ecological, policy, economic, societal

aspects etc.) to solve today's pressing questions regarding consumption and production patterns and the transfer of solutions into society and industry. This is done by taking into consideration new technologies and processes that integrate material and resource flows towards responsible impact flows as well as complimentarily focusing on consumption behaviors and the factor human being in relation to these flows, thus putting the manifold influence factors in harmony to each other and the surrounding environment.

Keywords: Sustainable Development, Responsible Material Flows, European Universities, European Higher Education Area, European Research Area

Introduction - The Europe of the Future

The creation of the European Union was aimed at putting an end to the numerous bloody wars between neighboring countries that resulted in World War II. Since 1950, the European Coal and Steel Community has been the beginning of the economic and political unification of European countries to ensure lasting peace (Europea.eu, 2020). The European Union is thus in principle the biggest peace project in history.

There are two very important aspects regarding the design of the European Union which shape its development in a more profound way than other areas, namely the European Higher Education Area (EHEA) and the European Research Area (ERA). They generate what we need for a stable society: capable and skilled Europeans that are culturally connected and work for the interest of future generations.

The European Higher Education Area (EHEA)

The European Higher Education Area (EHEA) is a unique international collaboration on higher education. The main goal of this initiative is to increase staff and students' mobility and to facilitate employability of graduates, increase social inclusion, civic engagement, innovation and environmental sustainability (European Commission, 2021). It is the result of the political will of 49 countries with different political, cultural and academic traditions. It is based on structural reforms and joint commitments as well as a common set of key values– such as freedom of expression, autonomy for institutions, independent student unions, academic freedom and free movement of students and staff (Bologna Process Secretariat, 2021). Through this process, all stakeholders of the area continuously adapt their higher education systems making them more compatible and strengthening their quality assurance mechanisms.

The European Research Area (ERA)

The Lisbon Treaty defines the European Research Area (ERA) as a unified research area open to the world and based on the Internal Market. The ERA enables free circulation of researchers, scientific knowledge and technology. The objectives of this

initiative are to improve the coordination of research activities on European level, to develop human resources, and to increase the attractiveness of European research to the best researchers from all over the world. (Austrian Federal Ministry of Science and Research, 2021). Why is this important? To strengthen the EU's scientific and technological bases, its competitiveness and its capacity to address grand challenges collectively.
Both areas have undergone significant development over the last twenty to thirty years. With the introduction of the ERASMUS program, in which to date more than 4 million students have been supported to study abroad, and the initiation of structural alignment through the Bologna Process a new era was entered in Europe (Schulze-von Laszewski, 2017). At first it was deemed absurd and undoable to send students abroad within their studies and now it has become a standard that has changed the way we think and approach education. Over the last two decades also in the ERA "a wide range of related policy reforms and initiatives have been successfully implemented" (Austrian Federal Ministry of Science and Research, 2021), contributing towards its overarching objective. The EU needs a strong EHEA and ERA to compete in every aspect on an ever stronger and competitive world stage which is facing a key period for transformation. Therefore, continuous development and world leadership is key in being a part of changing the planet and positioning the European Union as leader and role model.

Already in November 2018, research ministers confirmed the need to improve ties between the EHEA and the ERA, one major aspect of which are the European University Networks (Austrian Federal Ministry of Science and Research, 2021). With the foundation of the European Universities Initiative a huge leap forward was thus taken in further developing the areas. "The aim of this initiative is to bring together a new generation of creative Europeans able to cooperate across languages, borders and disciplines to address societal challenges and skills shortages faced in Europe" (European Commission 2021). The foundation of the alliances are not solely projects to be worked on and put into a drawer upon completion. They aim at a much higher goal, namely a changed future – through structural reform to contribute to the EHEA and ERA but in this specific case also through jointly addressing the most pressing societal challenge and positively developing it, namely *Responsible Consumption and Production - EURECA-PRO*.

It is a commonly understood fact that today's world is characterized by unprecedented environmental stresses. All anthropogenically induced negative Earth system trends (for example: biodiversity loss, terrestrial biosphere degradation, temperature rise, land alteration etc.) have accelerated in recent decades (Steffen et al., 2015). The reasons for this can be simply summarized as an explosion in global population growth, an increase in global wealth, both especially since the industrial revolution, and a huge concomitant increase in material use. Since the start of these developments global

contribution to this development has been unevenly spread. It seems that “in 2010 the OECD countries accounted for 74 % of global gross domestic product GDP but 18 % of the global population” (Steffen et al., 2015). Thus, it becomes obvious that “most of the human imprint on the Earth System is coming from the OECD world”. This trend seems to be changing, however, as indicators are starting to stabilize in OECD countries and much of the increase of activity and impact can now be detected in the fast-growing economies of the BRICS countries and the rest of the world (Steffen et al., 2015), making the future development of the trajectory of the Anthropocene largely dependent on urban development in Asia and Africa. The human influence, as it results in negative effects for the planet, delivers positive dynamics for individual human lives, however. Since the mid-twentieth century many millions of people have been helped out of deprivation through economic development, resulting in countless people who are the first generations in their families to ever “lead long, healthy and educated lives, with enough food to eat, clean water to drink, electricity in their homes, and money in their pockets and for many, this transformation has been accompanied by greater equality between women and men, and a greater political voice” (Raworth, 2018). It must be welcomed that the social development of the world is heading in such a positive direction as it is well known from the past that the world used to be a mostly unfavorable place for the majority of human realities. Fortunately, the long sought-after utopia of Cockaigne has already become a reality for most people today (Bregman, 2018). In terms of enabling these social and economic trends and sustaining this population growth, an ever-increasing amount of raw materials to supply the population with biomaterials, fossil energy, metals and construction materials is used for industrial activity. Especially demand and supply for bio materials, for food and construction materials for shelter have been strongly on the rise. Indeed, demand for raw materials corresponds directly with population growth and gross national incomes (Krausmann, et al. 2018). Globally, the consumption of raw materials increased from 6 billion tons per year at the beginning of the 20th century to 84 billion tons per year in 2015 (biomass, fossil fuels, metallic and non-metallic minerals). Projections predict a further increase to up to 182 billion tons per year in 2048 (European Innovation Partnership on Raw Materials EIP, 2018).

Methods

Each material has a specific environmental impact due to the way it is produced and how it is used and disposed of in the post-consumption phase. A stated target of the UN Sustainable Development Goals (SDG) is to decouple the production of materials from its environmental impact, as well as the required material use, from economic growth (United nations Environmental Programme UNEP, 2011). However, a mere reduction in material use, i.e. its quantitative decrease, does not automatically mean the qualitative improvement of its environmental sustainability and thus in many situations will not result in the urgently necessary environmental impact decoupling.

The matter of material flows, cycles and applications is a very complex interplay between many stakeholders and aspects and hence needs to be scrutinized in many interconnected dimensions in a systemic way. Circular economy, in-stock use, recycling, elements and substitution, thermodynamics, energy and exergy, consumer demand, production sustainability are just a few of the countless concepts that feed into this grand challenge.

Montanuniversität Leoben (MUL, AT), the Technical University Freiberg (BAF, DE), the University of Petrosani (UP, RO), the University of León (ULE, ES), the Technical University of Crete (TUC, GR), the Silesian University of Technology (SUT, PL) and Mittweida University of Applied Sciences (HSMW, DE) joined forces to create a strong and unique European University Alliance in the field of Responsible Consumption and Production (RCP) - EURECA-PRO - to address these challenges.

By creating such an alliance, a commitment was made by these seven European institutions to jointly change from within and to take on the challenge of systemically bringing together all the mentioned concepts and shed light on their systemic interplay to seek solutions. EURECA-PRO is getting ready for the new future. The human resources of the alliance include 54.500 students, 9.400 members of staff and 60 departments/faculties, supported so far by 24 associated partners from all over Europe with growing interest for associated partnership. Currently, EURECA-PRO activities are funded under ERASMUS+, H2020, the Austrian Exchange Service OEAD and other national ministries and agencies of the partner countries, amongst others the DAAD, Bundesministerium für Bildung und Forschung (D), Ministerul Educatiei (RO) and the Ministry of Science and Higher Education (PL) in the respective countries.

Mission and Vision

Vanessa Debiais-Sainton, Head of Higher Education Unit in the European Commission, is known to state that “This is not a project. It is a long-term vision on what the Alliance and the European Education (and Research) Area could look like in 2030 or even 2040“. In this way, EURECA-PRO follows a two-fold vision according to its mission statement. On the one hand, it aims at transforming the EHEA.

- It is a role model for civic engagement, equal participation and transparent joint governance as well as shared fundamental philosophies, common values and solution-oriented approaches regarding social cohesion, responsible citizenship and humanhood.
- The Alliance has established all necessary mechanisms to ensure academic freedom and development of free mobility throughout Europe. It has implemented effectively all necessary communication channels, dissemination and science communication measures to reach out to society.

On the other hand, it aims at transforming the ERA and society.

- By 2025 EURECA-PRO is well-known throughout Europe for its competence as an educational core hub and interdisciplinary research and innovation leader in qualitative environmental and social framework development for sustainable consumption and production of goods as well as responsible systems design.
- It is a major innovation contributor to the realization of the EU Green Deal and develops new technologies and processes that integrate primary and secondary resource material flows and efficient resource use in the sense of a Circular Economy. It delineates responsible consumption behaviors that are aligned with societal expectations as well as the Planetary Boundaries.

The overall approach of the alliance is thus to effectively contribute to solve the societal challenge of responsible consumption and production, specifically in the field of materials and their flows as they form the basis of the way we develop and define our societies. Building everything around this vision and mission, the alliance contributes to developing the EHEA as the two-fold missions perfectly complement and need each other. EURECA-PRO establishes shared governance, administration and content structures that allow for complementary collaboration and production of results. Students, society, industry and other external stakeholders are integrated into the creation of structures and contents to make EURECA-PRO inclusive, authentic and relevant.

Project structure

In the first three-year funded period, EURECA-PRO has set itself the goal of establishing joint structures in Research, Education, Innovation and Third Mission and is thus based on the knowledge square (integration of Research, Education, Innovation and Society) thus signifying high impact on environment, economy and society. Furthermore, the alliance will implement a strong governance basis in terms of joint administration and future collaboration phases. With the set targets of 13 milestones and 130 deliverables the alliance aims high. However, only delivering the defined agenda will not be enough to become a synergetic institution. For this the people, topics and mind-sets need to grow together which requires an immense amount of dedicated time for people work. Coordinating the incredible amount of human resources is a grand task that seems to expand everyday as the joint work penetrates the institutions more and more.

Research

The key to EURECA-PRO's strength in research is its interdisciplinary set-up. Each university brings into the alliance a different set of competencies that enable a systemic point of view in each approach to a challenge. This comprises technological, ecological, economic, societal, legal and policy aspects and their transfer into society and industry as illustrated in Figure 1. The first step taken in the research work was the creation of a *Scientific Framework Charter* that defines how the work is organized

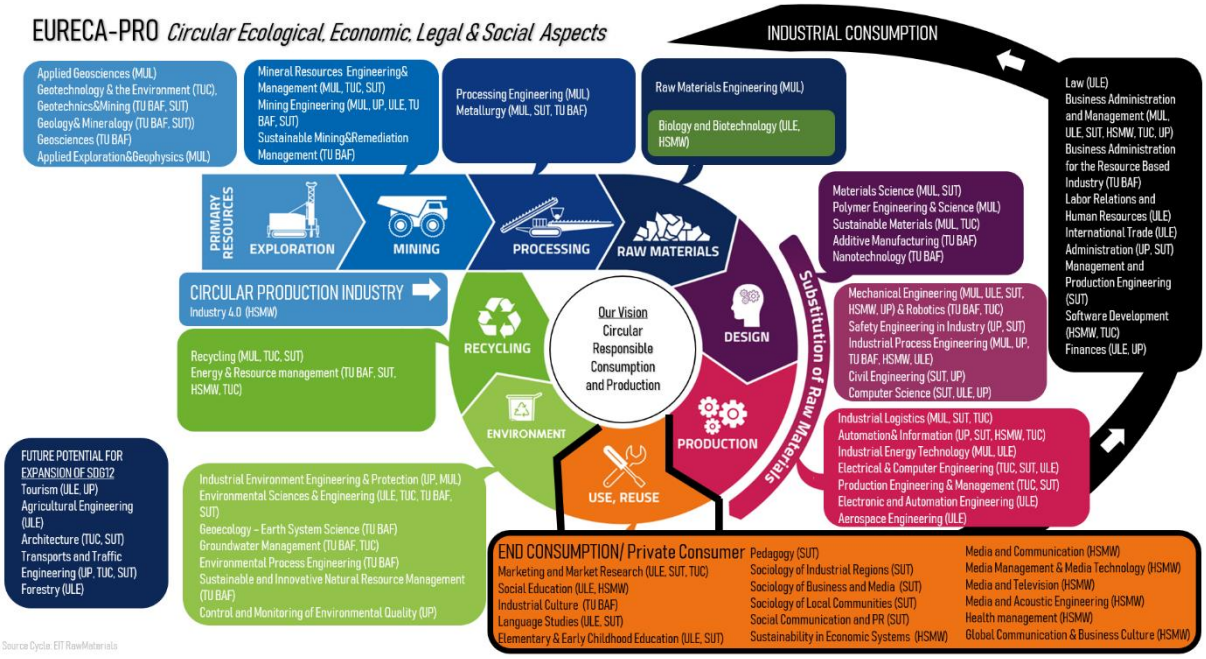

Figure 1 - Interdisciplinary competencies of EURECA-PRO (Moser et al. 2021)

in the research branch of the alliance and who is involved. The operative arm of the research branch is the *Research Task Force* (RTF). With the present competencies *Research Lighthouse Missions* regarding responsible consumption and production are established that address the most pressing current issues. It is the RTF that leads its members towards a common definition of the first three lighthouses from which then extended joint interdisciplinary research teams will be set-up to develop and work on the topics systemically and in depth. All the expertise that may be missing in the core consortium is sought after with the associated partners and Global Knowledge Alliances that will be formed. Currently, a common inventory of SDG12 related work is being set-up and the notion points towards desired work in responsible material flows, sustainable materials and products, environment and water as well as advanced energy technologies. The establishment of systemic responsible consumption and production models is of course a necessary task encompassing all topics. The final decision which lighthouses will be worked on is made in October. Once the sub-groups have created substantial content, this will be directly fed into definition and deduction of education contents. Society and industry are actively involved in the knowledge creation process through regular community building and open science events.

A crucial aspect of the research work is the commitment of EURECA-PRO to an open access policy. The knowledge created shall be openly accessible by all members of society. It will do so by building a common platform and uniform formatting for documents and on the production of FAIR (findable, accessible, interoperable and re-usable) data. Furthermore, following the *European Open Science Agenda*, the alliance will raise awareness among its research community through training on the importance

of *Open Science*. All existing open repositories of the partner institutions will therefore be merged into a common repository, which will be a thematic repository on responsible production and consumption. In the shared infrastructure, the *European Open Science Cloud* (EOSC) platform launched in 2018 will be implemented and used as both producer and consumer. A relevant task force to realize this process is already operative.

Education

The alliance defines education as an agent of change for the global sustainability challenges and driver of fundamental societal transformation processes, therefore as a central element in its work. Education is constantly in systemic interaction with knowledge creation and knowledge transfer. Therefore, the research work created directly flows into the alliance's educational formats. The operative arm of the education activities is the Education Council, consisting of the Deans and other education related members of the alliance's universities. They jointly implement EURECA-PRO's goals into their own institutions. The general structure of the work is to create a three- cycle education program in *European Studies* with the implementation of the EURECA-PRO PhD studies in October 2021, for which most of the legal work and structural processes have been completed, and following this the implementation of the EURECA-PRO Master and Bachelor Studies in October 2023.

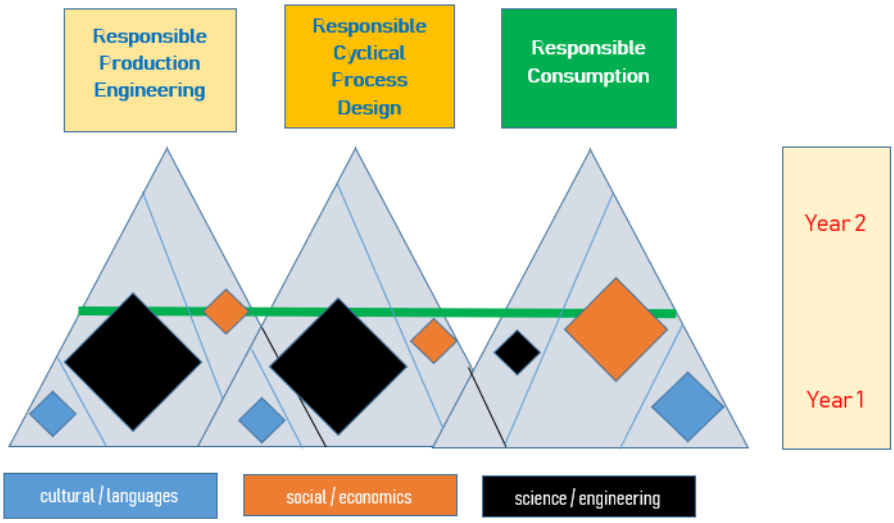

Figure 2 - Example of possible paths in Master of European Studies

This may sound almost conventional, however, the tracks designed for the students will be flexible as they allow for different fields of emphasis yet addressing the same overall area. Furthermore, students will be required to have a higher degree of mobility than in a regular student exchange, as well as additional transversal skills work (intercultural skills, languages and citizen action – digital language spaces, virtual exchanges and European identity courses, digital skills – digital management tools,

STEM skills – STEM project-based learning activities and courses, policies, incentives and outreach for enhanced inclusion of women in STEM, employability skills – leadership and related skills training). Moreover, the educational approach will include alternative didactic concepts such as a strong emphasis on problem-based learning (PBL) approaches but also training for teaching staff (teaching methodologies and didactics – teacher workshops and training, sustainability and social awareness, sustainability communication, social entrepreneurship) or the development of a digital platform for pedagogics and education (PEdPlat), online pedagogical training activities as well as the provision of guidance materials (e.g. MOOCS, electronic manuals and infographics) for implementation of the models in other HEIs. So far, the alliance has already successfully implemented the 14-lecture series “Responsible Consumption and Production”, partnered in the summer school “Digital CirCOOL – The Aluminium Cycle” and is holding the summer school “Responsible Consumption and Production for digitized Higher Education”. In 2022 together with the UNESCO Competence Center of Mining Engineering Education Austrian Branch, EURECA-PRO will hold a lecture series on the “Planetary Boundaries” with globally recognized experts.

Innovation

The educational aspect of EURECA-PRO also encompasses the innovation sphere through the implementation of joint innovation and entrepreneurship training courses. Students of EURECA-PRO have a required number of credits to complete as innovation and entrepreneurship courses to nurture their creative thinking ability and further a shift in their mindset through an amalgamation of creativity, experiential learning and skill building. It engrains in participants business basics, widens the understanding of packing ideas into business concepts, market basics, problem-solution thinking, business plan orientation and leadership skills. Creating consolidated value chain innovation services and pipelines such as idea camps, jump starter competitions, booster workshops and accelerator pipelines is an important means to give students the chance to foster their responsible consumption and production ideas into real businesses and thus promote start-up related activities. This is the most significant tool to create spin-offs from EURECA-PRO and put into practice what students and scientific staff learn in the innovation trainings. Through the outreach to industry and the formation of new alliances to the existing ones, capacities for internships for EURECA-PRO students is created. Moreover, by connecting existing and developing *Knowledge Transfer Offices* and their services, continuing education courses, summer courses and seminars on responsible consumption and production will be provided. Target groups will be: industry, government agencies and services and the community at large.

However, not only educationally innovation and knowledge transfer play an important role but also in the upscaling and marketing of EURECA-PRO solutions. For this, joint structures are implemented through the creation of an *Innovation Academy*, the

connection of existing and developing innovation and entrepreneurship centers as well as the creation of connected knowledge transfer centers. This will contribute to the diffusion of research and technology results through the development of university spin-off companies or patent licensing well beyond the geographic areas of each individual institution. The knowledge transfer will be facilitated not only by the use of the universities' physical facilities (libraries, scientific laboratories, computer facilities, and so on), but also through the creation of the virtual campus. This will have a synergistic effect on knowledge transfer at community/regional scale, since all universities involved are of similar academic nature and operate in regional areas with wide geographical diversity.

Third Mission

Today universities have to engage with cultural expectations, societal needs and economic development under the umbrella of ecological pressures to benefit society. Especially in the case of responsible consumption and production this is of utmost importance as it represents a pressing and highly topical interrelated cultural, societal and economic challenge. Through coordinated communication measures with the three stakeholder groups mentioned, a structured dialogue can be established, linking the university's activities with societies' own socio-economic context.

Measures to include local community involve: open science knowledge creation events, digital discussion forums, open house and STEM days, visits from schools and to schools in order to promote information flow towards the primary/secondary levels of education, newsletters/flyers, information sessions with the community at large (with presentation and Q&A from audience), newsletter/social media updates, community events and workshops on topics related to alliance theme.

In order to enhance the external image, science outreach also targets wider society and citizens with the aim to communicate scientific results, generate interest, establish trust and increase credibility. EURECA-PRO will show and explain the wide spectrum and diversity of sustainable developments in responsible consumption and production via project/problem-based learning (PBL), EURECA-PRO website content "for Society" and short videos about scientific findings/results, children asking professors as well as interviews with professors, as well as other dissemination channels.

Governance

The alliance understands that a solid governance structure is the key success factor to a functioning institution. EURECA-PRO has therefore developed a short-term and a long-term governance structure. The long-term plan foresees a four-phase development plan until 2040 when the vision is a complete intertwining of all

participating institutions to become a supra-institution.

- Phase II 2024-30 - Introduction of virtual administration
- Phase III 2031-40 - Deep demonstration of structures

- Phase IV (beyond 2040)

Phase I of this governance structure is concerned with setting scene or as such charting the way towards this vision which happens from 2020-2023. Within the first phase the governance layout is concerned with creating the basic structures such as the boards, councils and other related groups and underpinning the way they function. All partners contribute by seconding staff and students to the relevant boards and creation groups established. A very important committee in this respect is the *Student-Centred Co-Creation Group* that allows volunteer students of all the institutions to participate in the design of the new education, research and transversal programs. Furthermore, a legal situation analysis specifically with regards to a legal form, joint admission and automatic credit recognition as well as a funding screening to tap other funding sources will be made.

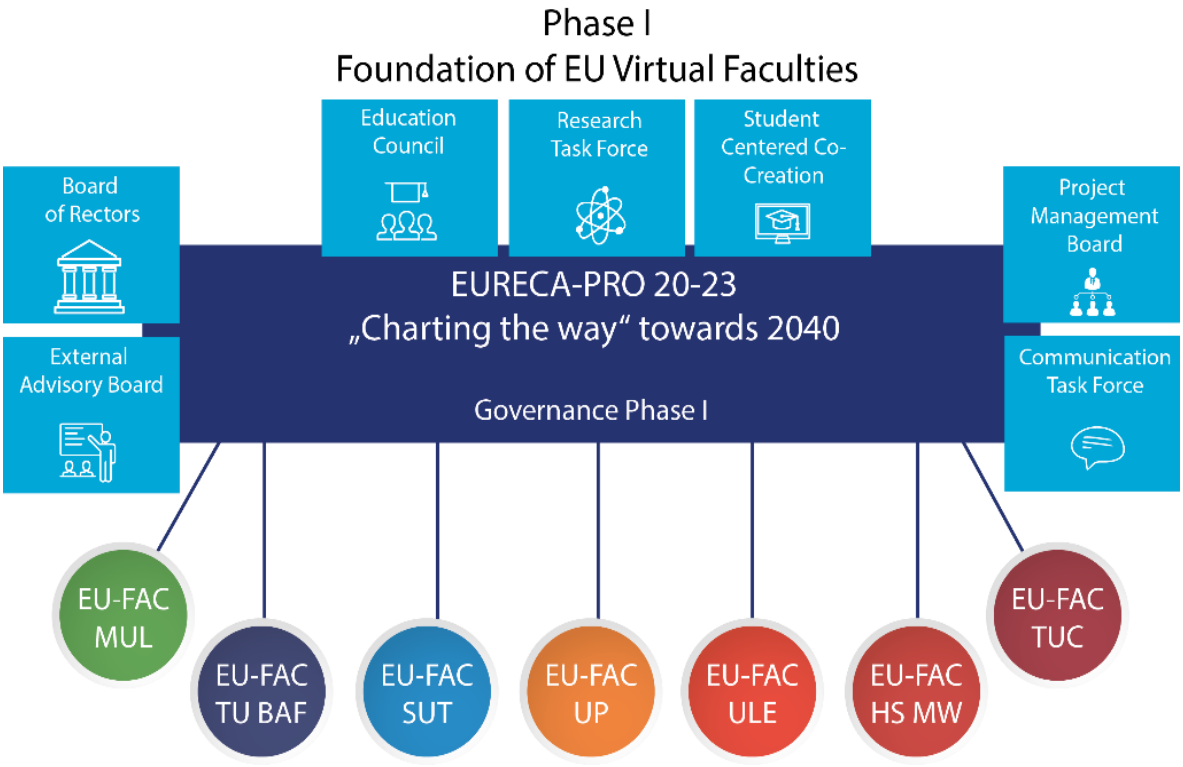

Figure 3 - Governance structure of EURECA-PRO (Moser et. al 2021)

Additionally, each partner designates EURECA-PRO spaces in their institutions to ensure shared work, education, research and infrastructure for transversal training for all participating students, researchers and staff that are constantly moving between the institutions (work space, lab infrastructure, housing, social etc.).

The digital platform and shared spaces

With regards to collaboration over distances, it is crucial to implement a system that allows for seamless collaboration for which digitalization is a key factor. Each of the

partners will implement virtual spaces that are shared with one another. All partners are equally contributing structurally through the establishment of joint digital

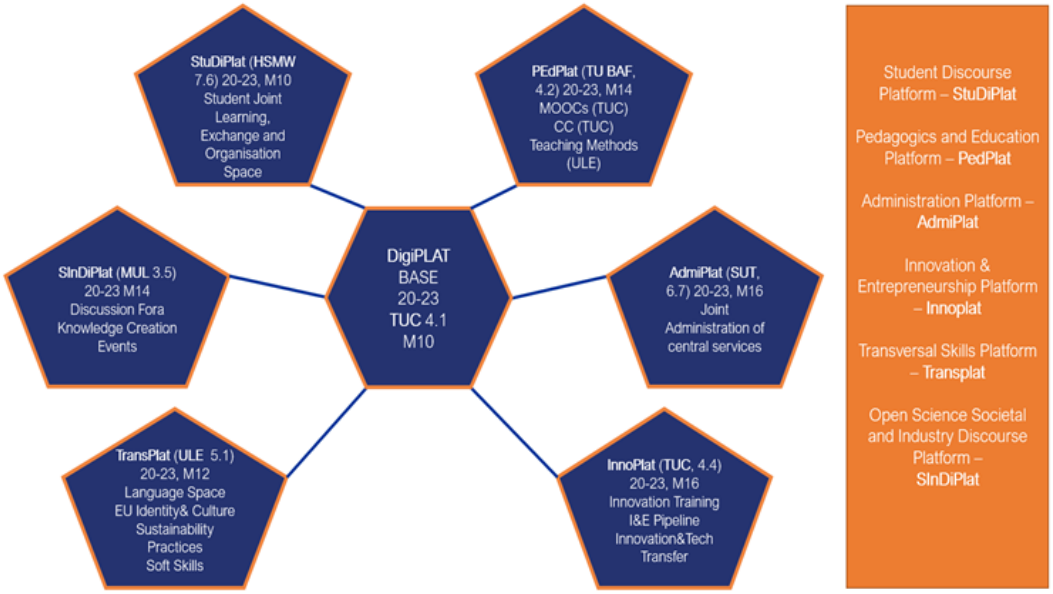

Figure 4 - Digital platforms of EURECA-PRO (Moser et al. 2021)

services that are then utilized by everyone. A digital master platform is currently being implemented as the software basis (DigiPLAT) for many individual platform branches that service each area of interest. Within the project period sub-platforms for open science, societal and industry dialogue and outreach (SInDiPlat), for staff and student training of transversal skills (TransPlat), for pedagogics and education (PEdPlat) and an innovation and entrepreneurship platform (InnoPlat) are implemented. In a subsequent governance phase after the first project period this is complemented by a student discourse and service platform (StuDiPlat) and a joint administration platform (AdmiPlat). The development of content is shared amongst partners. Communication structures, strategies and database design are carefully planned and implemented to guarantee maximum usability, efficiency and outreach.

EURECA-PRO following its two-folded vision will strengthen the excellence and completeness of the EHEA and ERA by addressing the highly cultural, societal and economic challenge of Responsible Consumption and Production, specifically in the field of materials and their flows as they form the basis of the way we develop and define our societies. Its developments include the complex matter of material flows, cycles and application which has to be looked at in an interdisciplinary and systemic way.

Results and Discussion

The implementation of EURECA-PRO has only started less than a year ago and it has become clear that the bold 2040 vision of being a key leader in the structural changes

of the EHEA and the ERA as well as being a key leader of the sustainable development of the EU, both at the same time, has a dimension that in this way has not been anticipated. The changes to be realized manifest themselves in grand challenges, huge bundles of tasks and everyday they branch out more into the structures of the university by involving more and more people and becoming more and more detailed. The originally planned goals require a great deal of detailed work when broken down into actually feasible chunks. Nevertheless, the realization of the work as described has been fairly efficient so far and the collaboration rather smooth. It seems as though the partners are a good fit and all up to the challenge. It has become more than clear, however, that this alliance will not become a European University in the anticipated sense if the people themselves do not grow together on a personal level. It would be fairly simple to just deliver all the work packages of the first three years and nothing else. According to project management standards this would suffice. However, this is not what will make the essence of the alliance or what will be the glue to hold it together. Every partner and every individual of each partner has a slightly different understanding of how what has been envisioned will be achieved. It is of essence to constantly be in dialogue with all the partners, in and across all levels and groups, to align the common understanding of the way forward, to forge friendships and shape the narrative that defines the social cohesion and collaboration within the alliance members. As the start of the alliance and its work fell right into the COVID-19 pandemic which forced the members to grow together solely on an online basis it is believed that the ties have not been forged yet to a level that they usually would have been. It is hoped though that the future outlook on this will be positive. All in all, it has become obvious that the successful management of all these aspects and developments on a supervisory level is a crucial aspect not to underestimate and to plan and carry out very thoroughly thought through. Without a comprehensive overview of how the branches of this tree grows it may quickly take on an unwanted shape.

Conclusions

EURECA-PRO following its two-fold vision will strengthen the excellence and completeness of the EHEA and ERA by addressing the highly cultural, societal and economic challenge of *Responsible Consumption and Production*, specifically in the field of materials and their flows as they form the basis of the way we develop and define our societies. Its developments include the complex matter of material flows, cycles and application which has to be looked at in an interdisciplinary and systemic way.

The *European Universities Initiative* itself is a game changer for the EU and EURECA-PRO is the “responsibility” part of it. Within this alliance there is the potential to transform the educational system and internal *Higher Education Instituions*’ structures, research in an interdisciplinary manner on crucial topics of global interest and prepare well-educated, open-minded, critical and transversal skilled leaders of tomorrow.

With this alliance a contribution to creating a new future is made in which our sons and daughters have educational opportunities past generations did not have, where they grow up as true European citizens with a true European mindset in a socially and ecologically sustainable environment where they and their children can thrive.

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