Complex Projects - Diverse Solutions?
Theoretical Reflection, Practical Experiences, and Recommendations on Enhancing Equality, Diversity, and Inclusion in Research Projects

Lessons learned by the HBP Diversity and Equal Opportunities Committee (DEOC) and further researchers, sceptics and enthusiasts

Authors: Karin GRASENICK (1), Pilar F. ROMERO (2), Arleen SALLES (3)

Contributors: Amal MATAR (7), Andrea ALONSO-ALLENDE (4), Annemieke MICHELS (4), Björn KINDLER (5), Katrien VAN LOOK (6), Katrin AMUNTS (10) Lars MUCKLI (9), Michele FARISCO (7), Mira MARCUS (8),

Discussants: the foundations of this paper were discussed in several meetings and received most valuable feedback and suggestions from: Abigail MORRISON (10), Camilla HAGEN BLIXHAVN (11), Damian EKE (12), Mathew BIRDSALL ABRAMS (13), Peter GIEROW (14), Sacha VAN ALBADA (10)

Editorial Review: Arleen Salles, Katrien Van Look

(1) *Convelop Cooperative Knowledge Design gmbh, CONVELOP* ***(2)*** *Universidad Politécnica de Madrid, UPM* ***(3)*** *Institute of Neuroethics, IoNx* ***(4)*** *EBRAINS aisbl* ***(5)*** *Heidelberg University, UHEI* ***(6)*** *École Polytechnique Fédérale de Lausanne, EPFL* ***(7)*** *Uppsala Universitet, UU* ***(8)*** *Tel Aviv University, TAU* ***(9)*** *University of Glasgow, UGLA,* ***(10)*** *Forschungszentrum Jülich, JUELICH* ***(11)*** University of Oslo, *UiO* ***(12)*** *De Montfort University Leicester, DMU* ***(13)*** *International Neuroinformatics Coordinating Facility, INCF* ***(14)*** *Linnaeus University, LNU*

Corresponding author: Karin Grasenick, convelop cooperative knowledge design gmbh, Hilgergasse 1, A-8010 Graz Austria. Email: karin.grasenick-at-convelop.at

Abstract Research, development, and innovation (RDI) are often carried out in public funded, multidisciplinary projects, which can be defined as complex. RDI projects depend on and involve various stakeholders that shape the framework conditions or are part of the project consortia. Unsurprisingly, the perceptions of stakeholders regarding, for example, the relevance of team diversity, and to which extent and how leaders should be made accountable for collaborative practices will differ.
In this paper we provide a novel framework applying complexity research to identify challenges in RDI projects that impact the implementation of Equality, Diversity and Inclusion (EDI). We thereby refer to equality in line with the European strategy towards gender equality and to inclusion as the attempt of actively involving and welcoming individuals and groups who may have been traditionally excluded or marginalised. We conclude with suggestions for three different types of involved organisations: research funding organisations (RFOs), research performing organisations (RPOs) and project consortia (PC). Framework and recommendations are reflected in the context of practical experiences made within the Human Brain Project (HBP) and are opened for further contributions by colleagues who are interested to share their experiences.
Keywords:
Equality, Equity, Diversity, Inclusion, Complex, Complexity Paradox, Tensions, Project, Research, Development, Innovation

Acknowledgements: This project/research has received funding from the European Union's Horizon 2020 Framework Programme for Research and Innovation under the Specific Grant Agreement No. 945539 (Human Brain Project SGA3).

1 Some are more equal than others

Research, development, and innovation (RDI) are often carried out in multidisciplinary projects, designed to pursue unique goals, and to provide novel insights that cannot be easily achieved within the frameworks of standardised structures and procedures. Such novel insights are more likely to be developed when collaborating across various disciplinary backgrounds and perspectives. However, stereotypical perceptions of talents, for example, regarding the ability to think logically, or for example, one-sided criteria to measure success can hinder the development of suitable working environments. In research, success is mainly measured by the number of publications and the extent to which they are cited. Such a criterion alone does not reward researchers who are willing to support colleagues in their career development or to establish a fair, collaborative team culture. One-sided measurements of achievements counteract the development of a culture that enables different talents to join, collaborate and be acknowledged for their contributions. It can be challenging to alter underlying stereotypes and norms and their effects on collaborative cultures. Moreover, measures undertaken are often understood as relevant for women or specific minorities, as if those in leadership positions are not to be included and could not possibly contribute to equality or to an inclusive working environment.

RDI projects depend on and involve various stakeholders that shape the framework conditions or are part of the project consortia. Such stakeholders are representatives of research funding organisations, research performing organisations, researchers, managerial staff, clinical staff, engineers, etc. contributing directly to the project, as well as people who will be affected by its outcomes. Unsurprisingly, the perceptions of stakeholders regarding, for example, the relevance of team diversity, and to which extent and how leaders should be made accountable for collaborative practices within a project will differ.

In this paper we provide a framework applying complexity research to identify challenges in RDI projects that impact the implementation of Equality, Diversity and Inclusion (EDI). We thereby refer to equality in line with the European strategy towards gender equality and to inclusion as the attempt of actively involving and welcoming individuals and groups who may have been traditionally excluded or marginalised. Through the approach we apply, it becomes clear that EDI is neither a head count exercise, nor a feel-good program, but about collaboration in general which is impacted by traditional performance measurement, various expectations and interests, and power relations. We conclude with suggestions for three groups of stakeholders who are involved in shaping the framework conditions for equality, diversity and inclusion (EDI) on three different levels: research funding organisations (RFOs), research performing organisations (RPOs) and project leaders. Framework and recommendations are reflected in the context of practical experiences made within the Human Brain Project (HBP) and further research collaborations.

2 Why various interests lead to complexity

RDI projects involve various stakeholders that differ in their interests and perceptions of which priorities should be set in terms of EDI and which measures will address these priorities adequately. Such differences can make the actual implementation challenging, especially if additional factors come into play, for example a long project duration, a large number of research tasks, and a high interdependence between those tasks. These factors add to the complexity of a project (Morcov et al. 2020; Douglas et al. 2020; Miller and Page 2010). The more complex a project is, the more difficult it is to predict and control the results (Marle 2016). In general, projects that involve many variables or a wide range of stakeholders are likely to be more complex than smaller projects which are more focused and straightforward. However, even a smaller number of stakeholders can leverage the complexity of a project due to their affiliation with heterogeneous subsystems such as politics, administration, and industry. (Baccarini 1996; Morcov et al. 2020; Stacey 2011)

For example, to administer public investments, RDI projects are requested to fulfil the criteria and the established reporting systems of partnering and funding institutions, which usually rely on common project management tools, like linear timelines, milestones, outputs and so called “key performance indicators” to reach predefined goals. Science, however, is a journey to an unknown land in which flexibility is most important. Thus, anticipating and following a predefined project plan as requested by funding institutions can become an additional burden rather than a helpful managerial practice. Classical project management tools and techniques have been criticised for providing an unrealistic framework for projects in which results are not easy to foresee. Instead, it has been suggested to balance standardised control with flexible adaptation to consider unforeseen developments (Batra et al. 2010; Hagan et al. 2011; Kiridena and Sense 2016).

3 How complexity affects Equality, Diversity and Inclusion

RDI projects are expected to deliver novel results and require high levels of expertise. Involved stakeholders need time to combine their know-how and generally aim to continue successful relationships in future projects. To finance projects, researchers rely on resources which usually can only be obtained by involving research funding institutions (RFOs), mainly via competitive calls. Such calls request proposals to not only demonstrate outstanding research but to additionally address cross cutting issues such as EDI. For example, in projects funded by the European Commission, women are expected to make up 50% of those in expert groups and evaluation committees and the gender balance among research teams is noted as a ranking criterion for proposals with the same score (European Commission 2020). Focusing on increasing the number of women and minorities in leadership positions might lead to perceiving them as elected only to change the statistics. In turn this will impact their capacity to establish themselves as independent leaders (Wroblewski 2019; Ruzycki et al. 2021; Iannotta et al. 2016). Such a goal and expected measures as described in the call might differ from what is considered reasonable by a) the researchers and b) the partnering research performing organisations (RPOs). The disagreement might revolve around which aspects of diversity should be of highest priority or which measures are adequate to increase the representation of women and minorities in leadership positions. Disagreements can be rooted in seemingly contradicting requirements which are expected to be met, such as using limited resources within a fixed time frame to prove outstanding scientific achievements via high impact publications and enhancing EDI simultaneously. Such seemingly contradicting requirements cannot be solved with simple solutions and may thus be defined as paradoxes (Cunha and Putnam 2019; DeFillippi and Sydow 2016).

DeFellippi and Sydow identify and describe the following five paradoxes that, they argue, are often ignored but must be managed in project networks, in which legally independent partners collaborate in various constellations. We consider these paradoxes highly relevant for the implementation of EDI in public funded RDI projects, due to the various stakeholders involved and the requirement to pursue the intended RDI goals and to contribute to overarching societal goals. The paradoxes may be described for EDI as follows:

1. Difference paradox between standardised managerial requirements and project specific solutions: RFOs rely on standardised plans and KPIs that can be applied across different projects. In Europe, for example, RDI projects must provide information on the percentage of women and men in leadership positions, due to the strategic gender equality goal. However, if RFOs set the same benchmark for every project, this goal will be impossible to reach in disciplines with a low number of female researchers, and therefore responsible persons will not be committed to the goal (Kleinberger-Pierer et al. 2020). Even though KPIs are important, focusing only on this KPI may signal that EDI can be reduced to leadership appointments without addressing the criteria applied to measure academic achievements and the underlying values and norms favouring a specific gender, and further diversity traits, such as ethnicity. While standardised approaches work well in simple and even complicated projects, different approaches are required in the contexts of high uncertainty and/or a lack of agreement between stakeholders (Stacey 2012; Bosch-Rekveldt et al. 2011; Allen et al. 2021).

2. Distance paradox or integrating projects as part of the partner organisations while simultaneously granting the responsible personnel room for manoeuvre: RFOs and RPOs expect that the projects they are involved in follow their specific EDI strategies and measures. Most recently Gender Equality Plans (GEPs) have become a mandatory requirement (Clavero and Galligan 2021; European Commission. Directorate General for Research and Innovation. 2021) at the institutional level for Horizon Europe. In other countries, attention is paid to whether research institutions adhere to certain standards, for example, through assessments (Rosser et al. 2019). Accordingly, guidelines and examples have been developed that focus on the level of RPOs. However, in most project consortia, researchers from several different RPOs collaborate, which raises the following questions: 1) which standards should be followed, and 2) to what extent are assessments, guidelines, and advice for organisations applicable on a project level. A project consortium must therefore deal with the differences and agree on measures for the project runtime that may differ from those followed in the partner organisation(s).

3. Identity paradox or the tension between identifying with a project, with one's partner organisation, and with individual values and norms: EDI principles, as requested to be implemented on project level, are rooted in societal values and norms regarding what is considered adequate behaviour. To implement the principles, researchers must dedicate some of their time and resources. However, success in science has been measured on an individual level, mainly via publications and their citations. Contributing to EDI, for example, by investing time and effort in creating an inclusive team culture, or for mentoring early-stage researchers (ESRs) might not be considered as relevant when it comes to deciding who will be the right candidate for an open position. Aiming for EDI causes tensions between identifying with individual career goals, with the project team, or with the team at their partner organisation.

4. The learning paradox regards how the expertise acquired by project members might be difficult to integrate in the respective partner organisations: EDI implementation often relies on additional experts and a dialogue on different approaches and experiences made within the project consortium. Thereby, the involved researchers will develop their own EDI expertise further. However, it is not guaranteed that this newly gained knowledge will be transferred to the involved RPOs and RFOs because they might not be sufficiently integrated in learning dialogues on a project level. Additionally, researchers, especially ESRs but also Principal Investigators (PIs) must demonstrate that they have been successful internationally, at multiple universities.

5. Temporal paradox concerns how each project needs a unique composition of competences while successful partnerships will most likely wish to further sustain their collaboration: Researchers are part of international communities in which they develop trusting and beneficial relationships which are crucial for successful collaborations. Previous successful experiences will not surprisingly increase the likelihood to informally plan future collaborations (Ebers and Maurer 2016). However, such practices counteract equal opportunities. Moreover, if partners are predominantly selected based on past experiences (Manning 2017), the resulting composition for a specific project might not match the required expertise. (Grasenick et al. 2008; Ligthart et al. 2016).

4 What project stakeholders should consider

What funding stakeholders can contribute

EDI is not just a moral issue but a key contribution to excellence, innovation and success (Hong and Page 2004; Schiebinger 2008; Schiebinger 2021). As such, EDI should be considered as an integral part of a proposal. RFOs set clear signals how principles should be implemented in RDI projects by providing guiding materials and proposal templates, evaluating proposals, offering interim reviews and monitoring, and by setting financial incentives or restrictions depending on how the criteria have been met. To support many different RDI projects, criteria are standardised, even though each project is unique with respect to content, stakeholder configurations, and contributing personnel. Throughout these unique projects, EDI expertise cannot be taken for granted. RFOs should therefore actively support scientists' efforts to collaborate with experts and insist on the integration of EDI expertise in decision-making boards.

To successfully contribute to EDI in RDI, dedicated resources that cannot be used otherwise are crucial to 1) develop a shared understanding of EDI, 2) build capacities, 3) harmonise regional differences, and 4) encourage taking the risk to collaborate with new partners:

1. Provide resources dedicated to developing a **shared understanding of EDI** within a project consortium, the participatory development of suitable structures and standard operating procedures, and continuous communication on EDI throughout project runtime. Such an investment at the beginning of a project enhances the effective use of resources during a project's runtime.

2. Ensure the availability of resources exclusively dedicated to **EDI capacity building**, assistance, and implementation. Reward project-specific strategies and measures with resources dedicated solely to EDI implementation on a project level. Encourage measures that enhance collaboration and learning across all genders, disciplines, and project roles.

3. Allow **regional, organisational, and social differences to be harmonised**, and provide easy-to-use funding for this purpose. Each partner organisation will have different regulations and measures in place, leading to unequal conditions for the staff contributing to a project. For example, with ESRs, researchers with family obligations or with specific needs may or may not be able to attend conferences due to travel costs and/or a lack of supportive facilities; regulations on the interruption and continuation of qualification agreements due to illness may disadvantage ESRs in specific countries.

4. Counteract the tendency of researchers to collaborate in well-established networks by supporting a good **balance between well-established collaborations and the integration of new partners**. Monitor the composition of project partnerships over time and allow risk-taking through new innovative partnerships.

When measuring EDI achievements RFOs rely on simple, standard indicators. However, focusing on these indicators only will not solve the underlying issues. Even with best intentions and precautions there will always be people who violate agreements, and such cases must carry consequences. However, openly **addressing violations of EDI principles** is difficult because doing so would mean drawing negative attention to the project and its stakeholders. If such difficulties would be acknowledged, RPOs and RFOs could jointly address these issues and strive for suitable solutions. To engage in a critical reflection, **evaluators must have expertise in EDI**. A stronger acknowledgement of the collaborative nature of RDI would be beneficial..

How Research Performing Organisations have a crucial role to play

Contracts with RFOs are usually not signed by the involved researchers but by the involved organisations who are legally independent. Each of the partner organisations will have regulations and measures in place that refer to EDI, for example dedicated units responsible

for programmes supporting women and/or minorities, regulations against discrimination and harassment or recruitment procedures. The researchers are expected to follow the defined regulations and support the measures in place.

In RDI projects, researchers, engineers, developers, managers of several RPOs will collaborate and temporary personnel will be recruited. RPOs can **routinely evaluate** how personnel engaged in projects perceive these experiences. To support project leaders training and advice should be offered and become mandatory for new personnel, which is especially relevant if one considers the constant turnover of researchers. Welcome packages can enable mutual learning are experienced as feasible on a project level and how measures can potentially be improved. Lessons learned should be summarised and shared specifically with service units that consult RDI proposals. They can provide an overview on measures that can be used by project consortia (e.g., support for families, mentoring programmes, travel funds) and raise awareness for regulatory framework conditions in different countries that might affect the implementation.

EDI competences must become a standard recruiting **criterion for all leadership positions**, and actual behaviour monitored, for example the career development of early stage researchers and managers of science alike, which should include offering perspectives and assistance after the end of a contract or project. Monitoring is only useful if leaders are held accountable. Additionally, awards send a clear signal that contributing to EDI is worthwhile. Awards on an organisational level, will be beneficial at project level too. They can be used to communicate organisational good practices and demonstrate the relevance of EDI for research, development, and innovation, and how EDI principles can guide an organisation.

An important aspect of these principles is the willingness to **counteract discrimination and exclusion** via informal networks. Although well-established collaboration based on trust are an important backbone for RDI projects, project leaders should be supported in engaging in new partnerships to foster innovation.

How project consortia can approach Equality Diversity and Inclusion

Implementing EDI in RDI projects can be challenging, as these projects are characterised by a high degree of uncertainty, complexity and paradoxical tensions. Decisions are made with incomplete information and unpredictable results (Snowden and Boone 2007; Candace et al. 1997) making it difficult for those involved to follow a predefined plan. Therefore, a continuous improvement approach (Priemus et al. 2013; Sanjive et al. 2005) and the use of regular reviews in search for synergies between paradoxical tensions are best for such projects (Schad et al. 2016). **Developing a shared understanding** of EDI priorities, related measures and challenges can be considered as a necessary starting point, implementation will require constant communication, the interactions of stakeholders or agents, as they are generally called in complexity research (Sweetman and Conboy 2018). Regular monitoring and reflection among all participating stakeholders can help to identify EDI-related challenges or barriers and will accordingly allow a project consortium to adapt strategies and measures.

The **co-creation of a vision** of what can be achieved together for a specific project will support the development of shared understanding and commitment towards EDI. The co-creation process ideally involves a variety of project stakeholders to integrate diverse perspectives and experiences. To implement agreed-upon strategies and measures successfully, the temporary project organisation must include appropriate competences. If EDI is to be taken seriously, the highest decision-making bodies must include at least one person with the related competences. Throughout the project, a powerful coalition (Kotter and Ameln 2019; Appelbaum et al. 2012) is needed, where power refers to stakeholders that are well-accepted, willing to act as role models, and to communicate the relevance of EDI.

Researchers must apply **appropriate procedures**, ensure transparency, and carefully **reflect and counteract** the effects of potential biases in a highly competitive environment. Procedures that contribute to the effectiveness of collaboration can also support the implementation of EDI principles. For example, by providing questions for reflections, easy-to-follow guidelines for participatory discussions and decision-making, distribution of work, research design, and tools that can be used in daily project tasks – from governance to research. Easy to access and user support is especially relevant if the number of stakeholders exceeds a typical team size or if staff fluctuations are expected during runtime due to the duration of the project.

EDI should be a **topic in all meetings** and decisions should reflected be reflected accordingly. Newly appointed leaders should be supported within the consortium to develop their **leadership skills** and base them on the agreed-upon EDI principles. Especially if representing a minority within the project it will be important to ensure that they are recognised as competent and independent, and thus not to cast doubt on their abilities. Holding, not only leaders, but also each team member accountable for balancing individual and collaborative goals will be crucial to move from lip service to an actual culture change. Feedback loops ideally link a project with its partner organisations, RFOs, or even potentially affected people, such as patients, users, and the broader public and thus aiming to share the various perspectives and lessons learned for the benefit of the overall RDI project network.

5 Five paradoxes and three roles to play

The recommendations on how to counteract five paradoxes that arise in complex projects can be summarised as follows for RFOs, RPOs and project consortia (PC). projects can be summarised as follows for RFOs, RPOs and project consortia (PC).

Table of actions that PCs, RFOs and RPOs can set to navigate paradoxical tensions.

Difference: Balance standards with tailored project solutions	
RFO	1. Insist on indicators that refer to EDI in collaborative practices and career support for early-stage researchers and scientists. 2. Make documentation on EDI implementation mandatory, ask for narratives for each indicator. 3. Ensure EDI expertise of evaluators and RFO personnel to discuss the specific challenges and achievements with project leaders.
RPO	1. Establish indicators that monitor how leaders implement EDI, aligned with the main RFOs and RPOs. 2. Constantly communicate organisational priorities, standards, and related documents. 3. Establish EDI competences as recruiting criteria for all leadership positions.
PC	1. Engage in a dialogue on what is relevant for the specific project and what is requested by RFOs and RPOs. 2. Agree on project specific goals and indicators aligned with RFOs' requests, adapt standard procedures and documents to include EDI and to be useful for the partnership. 3. Describe the project specific logic how the resources provided will lead to outputs and outcomes
Distance: Communicate and feedback on the requests of project stakeholders	
RFO	1. Allow regional, organisational, and social differences to be harmonised and provide easy-to-use funding for this purpose. 2. Provide resources dedicated to the participatory adaptation of suitable measures, structures and procedures. 3. Insist that EDI is reflected in all hierarchical levels of a project consortia.
RPO	1. Ensure that RDI proposals are consulted on EDI and raise awareness for the regulatory framework conditions in different countries. 2. Communicate measures of partnering RPOs that can be used by project consortia (e. g. support for parents, mentoring, travel funds). 3. Routinely evaluate how EDI implementation is perceived within projects, including temporary projects in the reflection.
PC	1. Establish a committee representing the composition of the project's internal stakeholders. 2. Ensure EDI expertise in highest decision-making bodies, evaluate how EDI is perceived by project staff, follow up with top leadership. 3. Implement transparent participation, raise awareness for unequal conditions, for example access to finance and family support.

Identity: Encourage the development of a shared identity

RFO	1. Provide resources dedicated to the development of a shared understanding of EDI, within a project consortium and constant communication of EDI. 2. Award project specific strategies and measures that enhance EDI, demonstrate how leaders are valued for their contribution towards a project culture based on EDI. 3. Hold leaders accountable for implementing EDI principles in their area of responsibility.
RPO	1. Communicate the relevance of EDI for research, development and innovation, and how EDI principles guide your organisation. 2. Encourage project leaders to actively support early-stage researchers, engineers, and managers in their career development and hold leaders accountable. 3. Award researchers and non-researchers for achievements in contributing to EDI.
PC	1. Co-create and constantly communicate a project specific EDI vision, strategies, and measures. 2. Design inclusive measures to enhance commitment across various diversity aspects, for example across all genders, ethnicities, and professions. 3. Make EDI top leadership priority, ensure EDI expertise for team development and leadership practice.

Learning: Transform EDI expertise into explicit, easy to apply knowledge

RFO	1. Build and constantly renew EDI capacities of RFO staff, and juries involved in evaluation processes. 2. Ensure resources and guidelines dedicated to EDI capacity building in projects. 3. Engage in an open dialogue with project consortia and RPOs on how to support the implementation of EDI
RPO	1. Introduce welcome packages and mandatory trainings for new personnel, as well as updates for everyone. 2. Encourage learning across various projects and departments, summarise lessons learned and make use of them for further improvements. 3. Get involved in feedback loops with RFOS.
PC	1. Offer opportunities to share experiences and gain knowledge. 2. Deliver key messages by stakeholders in leadership positions. 3. Engage in a dialogue with EDI experts and offer feedback for RPOs and RFOs.

Temporal: Include new partners in well-established project networks

RFO	1. Monitor the composition of project consortia over time, from one project to the next. 2. Support a good balance between well-known and new partners, via transparent calls and procedures. 3. Allow newly formed project consortia to partially fail.
RPO	1. Support project leaders in engaging in new partnerships to foster innovation. 2. Counteract discrimination based on informal networks and hidden agreements via transparent procedures. 3. Support EDI on team level via recruitment, onboarding, and career development.
PC	1. Carefully describe the expertise needed for the specific project and examine the partner constellation. 2. Demonstrate that collaboration based on EDI principles leads to novel insights and innovation. 3. Encourage the consideration of EDI in project specific open calls, workshops, and conferences.

Source: Karin Grasenick

6 Shared insights, evidence and contradictions

The case of the Human Brain Project

The Human Brain Project (HBP) is one of the European FET Flagships, an initiative aiming to develop visionary Future and Emerging Technologies (FET) via large scale, science driven projects (http://www.fetfx.eu/what-is-fet/, www.humanbrainproject.eu). It started in 2013 and is one of the largest research projects in Europe on the study of the brain and to translate results into medicine, technology, and computing. Over 500 scientists and engineers from more than 140 universities, teaching hospitals, and research centres across Europe and beyond collaborate in this neuroscientific project to provide brain atlases and models in different spatial scales, medical applications, software tools and technologies. The project was structured in four phases spread across a period of 10 years, each starting only after successful review of a comprehensive application. The results of each phase were evaluated, and adaptations have been made accordingly to the content and to the project structure, leading to more than 2000 collaborative papers and shared resources, including the creation of the EBRAINS Research Infrastructure. The HBP took several steps to arrive at a widely accepted EDI strategy. An external consultant, EAF Berlin, conducted a survey to derive suggestions and setup a first Gender Advisory Committee with members of different genders and roles within the project. This phase was followed by an open call for an organisation with gender expertise, the selected new partner, CONVELOP, was included first in the managerial part of project and for the last three years of the project, in a work package dedicated to responsible research and innovation.

The approach was based on an intersectional and inclusive understanding of gender equality. Equality, specifically equal opportunities, was defined as equal rights to access to information, to be considered for leadership positions and resource distribution in work packages solely based on competences rather than on informal networks and interest groups. Inclusion was defined as a culture of inter- and transdisciplinary collaboration, which includes respect of all disciplines, transparency; a fair distribution of workloads; support for diverse talents and support for all contributors regardless of how they may continue their career after the project. The derived EDI strategy comprised three main pillars to ensure that its activities and measures are structurally anchored and supported by the project members. The first pillar concerns the co-creation of an inclusive vision called “WE ARE HBP”, which stands for “Work for and Engage in Activities and Research for Equality in the HBP”. The second pillar is the structural anchoring of the DEOC as an advisory body of the HBP. Finally, the third pillar is the development of Gender Action Plans (GAP) (Grasenick Karin 2021) outlining activities which included the integration of diversity dimensions in HBP research and innovation.

In practice, the DEOC was established as an advisory body to the Project Coordination Office (PCO) and Directorate (DIR) of the project. The DIR itself invited work package leaders to nominate members, preferably two of different genders. Additionally, everyone in the project was free to join the DEOC, to contribute or seek advice. The DEOC was composed of HBP board members, leaders, scientists, engineers, or managers of different genders, ethnicities, nationalities, ages, career stages, and religion. It can be considered as a “microcosm” of the project where a variety of experiences and perspectives must come to an agreement on EDI measures. The committee provides advice and feedback on the GAP and on activities planned to improve equality in their respective areas of responsibility. The committee has a regular flow of communication and meetings supported by the coordinator. It submits quarterly reports to the DIR, and it has a presence in the Scientific and Infrastructure Board (SIB) meetings where it presents findings and measures, and suggests how to consider EDI in the discourse and decisions of the SIB. The DEOC members bring messages to their work packages and support with the implementation of the measures and activities.

The HBP strives to implement inclusive measures. The inclusive design of measures is exemplified by the HBP Mentoring Programme which supported both women and men, independently of their profession and role. The programme paid specific attention to women in administrative positions who often have a scientific background but are confronted with difficulties to balance family obligations with an academic career. Mentoring programmes offer general career advice for a more distant future but usually they are not related to open positions within a project. Therefore, the DEOC measures focused strongly on selection procedures for leadership positions and lead scientists, to calls for workshops and partnering projects and related guidelines on how to ideally design such processes.

When assessing the representation of women in leadership positions as requested, the reflection was based on the cascade model, for which women and men are expected to be represented at each career level in the same proportion to the level below (Wroblewski and Lipinsky 2018; Deutsche Forschungsgemeinschaft 2020). The initial figures were based the European SHE FIGURES, (European Commission. Directorate General for Research and Innovation. 2019).

Challenges: reaching out through the project consortium

The complexity of the HBP, an ambitious remote collaboration across different institutions and disciplines affected the possibilities to implement EDI principles. A suitable approach was not requested for the original proposal but only after the first, so called ramp-up phase. This made it difficult for leaders who advocated for EDI to convince the consortium of the importance and to ensure the appropriate dedication of resources. Based on the suggestions made in the initial survey a GAP was prepared with a focus on gender only and more suitable for specific organisations or smaller projects which cannot. This version of the GAP did not find the necessary approval because it seemed to be difficult to implement into a large-scale project. Only with a broader understanding of gender and diversity in research and a newly established committee, in which many former members participate, was it possible to develop a new plan that was also endorsed by the highest decision-making bodies of the HBP.

The implementation of the GAP was first challenged by keeping up with Executive Board decisions that, were often not considered relevant in this respect, but in fact offered opportunities towards the implementation for EDI. For example, open calls or the design of workshops provided the opportunity to solicit contributions, pose reflective questions, and assess the responses. Only when the DEOC coordinator was invited as a guest to the SIB meetings could these opportunities be utilised.

By setting the focus on raising awareness and collaborating with the DIR and SIB, broader communication throughout the project and towards public visibility could not be implemented to the desired extent. Some measures gained excellent feedback but reached a comparable small group of personnel, for example overall 45 mentoring partnerships were established and approximately 100 participants joined the in-person workshops at the HBP Summits and student conferences. Some of the originally planned measures, like collaborating with the gender and diversity units at the partnering universities turned out to be too resource intensive for a project of this size.

To receive feedback and direction for the final years of the HBP, a survey on collaboration and diversity in the HBP was conducted in May 2021. Most survey respondents were explicitly satisfied with their social networks and collaboration within the HBP. Room for improvement was indicated for a fairer distribution of work and balance of professional and family obligations. It was critically reflected that leadership by a rather homogenous group in terms of ethnicity, gender and age are a European phenomenon which was also evident in the HBP and impacted if and how gender/diversity were perceived and counteracted. Homogeneity in leadership makes it more difficult for minorities to be heard and to be recognised as valuable contributors.

The challenges of an interdisciplinary project with many distributed partners were addressed by respondents' uncertainty to the extent to which decisions of governance bodies were known and transparent to everyone throughout the project. The HBP therefore strengthened its effort to improve interaction within the consortium and across hierarchies, e. g. by initiating more (virtual) town hall meetings, redesigning the internal newsletter and by informing on tasks and decisions of the different boards. Respondents brought in additional ideas that can easily be implemented such as to ensure that HBP news and events report and include contributors of all genders, career stage and ethnicity/race. Many constructive suggestions were made, relating primarily, but not exclusively, to gender diversity and leadership. Some suggestions have been difficult to implement in a project where many decisions concerning recruiting, salaries and leadership are taken on a local, institutional level. Simultaneously, some HBP measures were not known to many respondents, although they had been communicated through various channels (e. g. the HBP mentoring programme).

The recommendations described in direct relation to the addressed paradoxical tensions, can be extended based on survey, for further projects facing the challenges of large-scale projects expected to collaborate successfully towards a common goal, despite diverse communities of contributors and phases of restructuring:

- Consider measures for new personnel joining a complex project, support networking and integration across distances and different disciplines, and strengthen cohesion.
- Pay attention to participation, communication of shared values and standards, decisions, and diversity measures.
- Offer career guidance and encourage leaders to actively support scientists and scientific managers alike, offering perspectives after the end of the contract or project.
- Support newly appointed leaders, to be recognised as competent and independent.

Despite all the difficulties and limitations, one can state that the HBP has played a pioneering role in implementing EDI. Despite the project's complexity, the gender balance of scientists in leadership positions improved from 16% women in September 2017 to 36% women by 2022.

Reflections and resulting documents have been generalised and made available via the EDI Toolkit (https://www.edi-toolkit.org/) for project governance and research design. The EDI Toolkit is designed for everyday usage, offering (i) basic information, (ii) guiding questions for developing a governance framework, (iii) quick checklists for designing structures and procedures, and (iv) measures for supporting leadership, talent, and events. It offers support to establish standards for interactions, engagement, and decision-making.

Further stories we ask for

1. Have you been involved in a project dedicated to research, development and/or innovation and a story to share?

2. What were the main characteristics of the project? How would you describe your personal experiences?

3. Which project strategies and measures for equality, equity, diversity and/or inclusion (EDI) were in place?

4. What were the greatest challenges, the positive outcomes, and maybe the greatest disappointments in regard to

    a) the requests of funding institutions?
    b) the implementation and accountability of suitable structures, procedures, measures?
    c) the development of a shared understanding and a vision for EDI?
    d) the building of EDI capacities and the sharing of lessons learned throughout the project and beyond?
    e) the integration of new partners and the relevance of informal networks?

5. What else is relevant for you?

7 Sources of knowledge we build on

Allen, Kelly-Ann; Butler-Henderson, Kerryn; Reupert, Andrea; Longmuir, Fiona; Finefter-Rosenbluh, Ilana (2021): Work like a girl: Redressing gender inequity in academia through systemic solutions. In *JUTLP* 18 (3), pp. 14–29. DOI: 10.53761/1.18.3.3.

Appelbaum, Steven H.; Habashy, Sally; Malo, Jean‐Luc; Shafiq, Hisham (2012): Back to the future: revisiting Kotter's 1996 change model. In *Journal of Management Development* 31 (8), pp. 764–782. DOI: 10.1108/02621711211253231.

Baccarini, David (1996): The concept of project complexity—a review. In *International Journal of Project Management* 14 (4), pp. 201–204. DOI: 10.1016/0263-7863(95)00093-3.

Batra, Dinesh; Xia, Weidong; VanderMeer, Debra; Dutta, Kaushik (2010): Balancing Agile and Structured Development Approaches to Successfully Manage Large Distributed Software Projects: A Case Study from the Cruise Line Industry. In *CAIS* 27. DOI: 10.17705/1cais.02721.

Bosch-Rekveldt, Marian; Jongkind, Yuri; Mooi, Herman; Bakker, Hans; Verbraeck, Alexander (2011): Grasping project complexity in large engineering projects: The TOE (Technical, Organizational and Environmental) framework. In *International Journal of Project Management* 29 (6), pp. 728–739. DOI: 10.1016/j.ijproman.2010.07.008.

Candace, Jones; Hesterly, William S.; and Borgatti, Stephen P. (1997): A general theory of network governance: Exchange conditions and social mechanisms. In *Academy of Management Review* 22 (4), pp. 911–945, checked on 3/18/2023.

Clavero, Sara; Galligan, Yvonne (2021): Delivering gender justice in academia through gender equality plans? Normative and practical challenges. In *Gender Work Organ* 28 (3), pp. 1115–1132. DOI: 10.1111/gwao.12658.

Cunha, Miguel Pina e.; Putnam, Linda L. (2019): Paradox theory and the paradox of success. In *Strategic Organization* 17 (1), pp. 95–106. DOI: 10.1177/1476127017739536.

DeFillippi, Robert; Sydow, Jörg (2016): Project Networks: Governance Choices and Paradoxical Tensions. In *Project Management Journal* 47 (5), pp. 6–17. DOI: 10.1177/875697281604700502.

Deutsche Forschungsgemeinschaft (2020): Die Forschungsorientierten Gleichstellungsstandards der DFG: Zusammenfassung und Empfehlungen. Available online at https://www.dfg.de/download/pdf/foerderung/grundlagen_dfg_foerderung/chancengleichheit/fog_empfehlungen_2020.pdf

Douglas, Andre; Mazzuchi, Thomas; Sarkani, Shahram (2020): A stakeholder framework for evaluating the -ilities of autonomous behaviors in complex adaptive systems. In *Syst Eng*. DOI: 10.1002/sys.21555.

Ebers, Mark; Maurer, Indre (2016): To Continue or not to Continue? Drivers of Recurrent Partnering in Temporary Organizations. In *Organization Studies* 37 (12), pp. 1861–1895. DOI: 10.1177/0170840616655490.

European Commission (2020): A Union of Equality: Gender Equality Strategy 2020-2025 (COM(2020) 152 final).

European Commission. Directorate General for Research and Innovation. (2019): She figures 2018: Publications Office.

European Commission. Directorate General for Research and Innovation. (2021): Horizon Europe guidance on gender equality plans: Publications Office.

Grasenick, Karin; Wagner, Gabriel; Zumbusch, Kristina (2008): Trapped in a net: network analysis for network governance. In *VINE* 38 (3), pp. 296–314. DOI: 10.1108/03055720810904826.

Grasenick Karin (2021): Gender Action Plan. 10.5281/ZENODO.5535670

Hagan, George; Bower, Denise; Smith, Nigel (2011): Managing Complex Porjects in Multproject Environments. In Lou Eric, Peng Chong Siao (Eds.): Procs 27th Annulal ARCOM Conference. Association of Researchers in Construction Management, pp. 787–796.

Hong, Lu; Page, Scott E. (2004): Groups of diverse problem solvers can outperform groups of high-ability problem solvers. In *Proceedings of the National Academy of Sciences of the United States of America* 101 (46), pp. 16385–16389. DOI: 10.1073/pnas.0403723101.

Iannotta, Michela; Gatti, Mauro; Huse, Morten (2016): Institutional Complementarities and Gender Diversity on Boards: A Configurational Approach. In *Corporate Governance: An International Review* 24 (4), pp. 406–427. DOI: 10.1111/corg.12140.

Kiridena, Senevi; Sense, Andrew (2016): Profiling Project Complexity: Insights from Complexity Science and Project Management Literature. In *Project Management Journal* 47 (6), pp. 56–74. DOI: 10.1177/875697281604700605.

Kleinberger-Pierer, Magdalena; Pohn-Weidinger, Simon; Grasenick, Karin (2020): Fair projects - bad data? Evaluating the gender balance in science projects. fteval Journal (50) 10.22163/fteval.2020.471, pp.60-71

Kotter, John; Ameln, Falko von (2019): Agility, hierarchy and lessons for the future. John Kotter on the legacy and future of Change Management. In *Gr Interakt Org* 50 (2), pp. 111–114. DOI: 10.1007/s11612-019-00461-5.

Ligthart, Rik; Oerlemans, Leon; Noorderhaven, Niels (2016): In the Shadows of Time: A Case Study of Flexibility Behaviors in an Interorganizational Project. In *Organization Studies* 37 (12), pp. 1721–1743. DOI: 10.1177/0170840616655487.

Manning, Stephan (2017): The rise of project network organizations: Building core teams and flexible partner pools for interorganizational projects. In *Research Policy* 46 (8), pp. 1399–1415. DOI: 10.1016/j.respol.2017.06.005.

Marle, Franck (2016): Managing Complex, High Risk Projects. A Guide to Basic and Advanced Project Management. 1st ed. 2016. London: Springer (SpringerLink Bücher).

Miller, John Howard; Page, Scott E. (2010): Complex adaptive systems. An introduction to computational models of social life. STU - Student edition. Princeton, N.J: Princeton University Press (Princeton studies in complexity). Available online at http://www.jstor.org/stable/j.ctt7s3kx.

Morcov, Stefan; Pintelon, Liliane; Kusters, Rob (2020): Definitions, characteristics and measures of IT project complexity - a systematic literature review. In *IJISPM* 8 (2), pp. 5–21. DOI: 10.12821/ijispm080201.

Priemus, Hugo; Bosch-Rekveldt, Marian; Giezen, Mendel (2013): Dealing with the complexity, uncertainties and risk of megaprojects: redundancy, resilience and adaptivity. In : International Handbook on Mega-Projects: Edward Elgar Publishing, pp. 83–110.

Rosser, Sue V.; Barnard, Sarah; Carnes, Molly; Munir, Fehmidah (2019): Athena SWAN and ADVANCE: effectiveness and lessons learned. In *Lancet (London, England)* 393 (10171), pp. 604–608. DOI: 10.1016/S0140-6736(18)33213-6.

Ruzycki, Shannon M.; Franceschet, Susan; Brown, Allison (2021): Making medical leadership more diverse. In *BMJ (Clinical research ed.)* 373, n945. DOI: 10.1136/bmj.n945.

Sanjive, Augustine; Payne, Bob; Sencindiver, Fred; Woodcock, Susan (2005): Steering from the Edges. Agile project management lets software project managers and employees alike adapt to changing circumstances, rather than try to impose rigid formal controls, as in traditional linear development methods. In *Communications of the ACM* 48 (12), pp. 85–89, checked on 3/18/2023.

Schad, Jonathan; Lewis, Marianne W.; Raisch, Sebastian; Smith, Wendy K. (2016): Paradox Research in Management Science: Looking Back to Move Forward. In *The Academy of Management Annals* 10 (1), pp. 5–64. DOI: 10.1080/19416520.2016.1162422.

Schiebinger, Londa (2021): Gendered Innovations: integrating sex, gender, and intersectional analysis into science, health & medicine, engineering, and environment. In *Tapuya: Latin American Science, Technology and Society* 4 (1), Article 1867420. DOI: 10.1080/25729861.2020.1867420.

Schiebinger, Londa L. (Ed.) (2008): Gendered innovations in science and engineering. Stanford, Calif.: Stanford University Press.

Snowden, David J.; Boone, Mary E. (2007): A Leader's Framework for Decision Making. Wise executives tailor their approach to fit the complexity of the circumstances they face. In *Harvard Business Review* 85 (11), pp. 68–78, checked on 3/18/2023.

Stacey, Ralph D. (2011): Strategic management and organisational dynamics. The challenge of complexity to ways of thinking about organisations. 6th ed. Harlow: Financial Times Prentice Hall.

Stacey, Ralph D. (2012): Tools and Techniques of Leadership and Management. Meeting the Challenge of Complexity: Routledge.

Sweetman, Roger; Conboy, Kieran (2018): Portfolios of Agile Projects. In *Project Management Journal* 49 (6), pp. 18–38. DOI: 10.1177/8756972818802712.

Wroblewski, Angela (2019): Women in Higher Education Management: Agents for Cultural and Structural Change? In *Social Sciences* 8 (6), p. 172. DOI: 10.3390/socsci8060172.

Wroblewski, Angela; Lipinsky, Anke (2018): Steering by Evaluation in Times of Impact Orientation and Monitoring? Edited by fteval Journal (45), pp.22-27