Karlsruhe Institute of Technology

Käte Hamburger Kolleg
Cultures of Research

RWTH AACHEN UNIVERSITY

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The Transformation Challenge: Re-Thinking Cultures of Research

Interdisciplinary International Graduate Summer School
XLIII Summer Courses
Miramar Palace, Donostia-San Sebastián

July, 01 – 05, 2024

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Prof. Hannot Rodríguez, University of the Basque Country – UPV/EHU, Spain
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INSTITUTE FOR TECHNOLOGY ASSESSMENT AND SYSTEMS ANALYSIS (ITAS)

Donostia-San Sebastián

Donostia-San Sebastián is a small city of 183,000 inhabitants, with a remarkably high level of cultural activity for its size. The beauty of its Bay, known as the Pearl of the Cantabrian Sea; its situation in a natural amphitheatre facing the sea and protected by mountains; its quality of life, and its famous gastronomy have turned it during the past two centuries into a world-class tourist destination.

Shaped by history, it started out as a fishing village; grew as a market town and military fort, with the invasion by Napoleon's troops; and after being almost completely destroyed in 1813 by the garrison's battle against the Anglo-Portuguese, it was chosen by Queen Isabel II as the royal family's summer residence and began to flourish as a services city.

It was in the late 19th and early 20th century that Donostia-San Sebastián emerged as a city of culture, full of amenities and a main tourist destination. Its majestic buildings and their eclectic style, which reflected the contemporary tastes of the royal family and bourgeoisie, give it a stately character that has adapted well to changing times.

Cultural activity grew at the same pace as tourist activity, so that today the city boasts a top quality performing arts and cultural programme. The International Film Festival, the 'Jazzaldia' Jazz Festival and Music Fortnight are the highlights of its year-round programme.

Donostia-San Sebastián is world famous as a food tourism destination, since it's collected more Michelin stars per square metre of its territory than anywhere else in the world; and, as the birthplace of the "new Basque cuisine" movement, it's nurtured the renaissance of Basque gastronomy. The quality of its ingredients and its world famous "pintxos" give much pleasure to both local people and visitors all year round.

Because of its gastronomy, culture, beauty and maturity as a tourist destination, along with accommodation and tourist resources of great variety and exceptional quality, Donostia-San Sebastián is a very important tourist destination, welcoming over 400,000 visitors per year.

Miramar Palace

This palace was created for queen María Cristina and the royal family, after the queen decided to have her official summer residence in Donostia-San Sebastián from 1887. It enjoys impressive views of the two beaches in the bay and the Island of Santa Clara, which is directly opposite.

Miramar Palace was built in the 'queen Anne English cottage' style under the direction of English architect Seldon Wornum, who also designed different palaces in Biarritz and San Juan de Luz. It was built of brick and sandstone blocks with a timber frame. Its gardens are the handiwork of master gardener Pierre Ducasse, who also designed the gardens of Aiete Palace and Gipuzkoa Square.

Source: Official website of the Donostia-San Sebastián Tourism Office (http://www.sansebastianturismo.com)

A. **Palacio** de **Miramar**
Paseo de Miraconcha, 48, 20007 Donostia-San Sebastián
943 21 90 22
10 opiniones

The Transformation Challenge: Re-Thinking Cultures of Research

Interdisciplinary International Graduate Summer School

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Donostia-San Sebastián, July 01 - 05, 2024

Transformation is the present-day topic. Sustainability, climate change, war situations, authoritarianism, and many other major challenges are on the fore – including the insight that old recipes, convictions and strategies no longer lead to solutions without difficulty. And science makes no exception here. It appears relevant but increasingly controversial. Hopes that in knowledge societies, through the spread of knowledge, conflicts would be more easily pacified, have been largely disappointed. On the contrary, it is apparent that conflicts that are fought out with the means of scientific knowledge can deepen conflicts and ambivalences. Uncertainty and non-knowledge become much more sharply visible. Science is no longer regarded as an unchallenged problem-solving machine for social problems. Science is disputed. Science is ignored. Science is powerful and at the same time powerless.

How does this ambivalent positioning of science relate to questions of transformation? "Transformation", conceived as a project and a mission (and not just as a set of evolutionary processes of societal change), is closely linked to the development of science. In order to analyze and shape transformation, the conditions, varieties and changes affecting scientific knowledge production in contemporary societies need to be better understood (e.g., situated, evidencebased, transdisciplinary, participatory modes of knowledge production). The following are some illustrative examples of all this:

i. Knowledge production is changing from within. New, digital technologies for data collection and evaluation enabled by AI algorithms are increasingly used to solve complex research tasks. These have the potential to shift fundamental coordinates of scientific knowledge production. Issues such as limited reproducibility or non-transparency (e.g., as a result of the use of software; Hocquet 2022) are common here
ii. New criteria regarding inclusion, solutions and future direction come into play as new relevance requirements for science become increasingly important or even necessary. This brings a particularistic unrest into the system of knowledge production, where context-related, not generally applicable methodologies and solutions are becoming gradually more relevant (e.g., within living labs or anticipatory research practices).
iii. Post-colonial studies and feminist STS vindicate the importance of taking into account factors such as standpoint-binding and representation in order to understand knowledge production in the light of issues such as epistemic injustice, raced-gendered scientific dynamics, or the development of alternative non-Western forms of knowing (Harding 2003; Adams 2019). These multi-layered representation-related factors concern not only individuals but also groups or collectives. Pointedly: Do different cultures of "scientificity" (e.g., Carrier 2022) emerge in sectoral and global comparisons?
iv. Science in transformation is increasingly becoming an engaged science. This seems to shift the balance between distancing and engagement. For instance, under innovative initiatives such as living labs with citizens, science leaves the special institutional experimental spaces and co-creates research and solutions together with societal actors.

The aforementioned indications of problematization can be precisely illuminated through the lens of "cultures of research": To what extent are cultures of research and their legitimizing basis changing

and to what extent is their change an expression of transformative changes in society? The aim of the Summer School is to explore these interrelationships. The following strands can be identified (without exhaustion):

a. Transformation of science: What changes are emerging within science itself and how can these be characterized as changes in cultures of research?
b. Transformation through science: Science is a major driver of transformation. What phenomena and examples can be used to illustrate this?
c. Science in the midst of transformation: Social change is seen as an essential strand of solutions in so-called "grand challenges". Which forms of transformation and which forms of science correlate?
d. Overall: How do these strands of transformation interact with each other? Do different varieties of science emerge depending on where problem-solving processes take place? What does this implicate for the transformative challenge of, and for, science on interregional, international-global and intercultural scales?

Keynote speaker (confirmed)

Prof. Dr. Guido Caniglia, KLI – Konrad Lorenz Institute for Evolution and Cognition Research, Austria

Prof. Dr. em. Helen Longino, Department of Philosophy, Stanford University, USA

Prof. Dr. Clark Miller, Global Institute of Sustainability and Innovation, Arizona State University, USA

Prof. Dr. Harald Rohracher, Department of Thematic Studies, Linköping University, Sweden

Interdisciplinary International Graduate Summer School
The Transformation Challenge: Re-Thinking Cultures of Research

Venue: Miramar Palace, 20007 Donostia-San Sebastián, Gipuzkoa, Spain

Monday, July 01, 2024

14:30-16:30	**Opening Ceremony and Welcome-Session** Interactive Session about the topic of the Summer School
16:30-17:00	***Coffee Break***
17:00-18:30	*WS 1: Experiments (Part a: real-world experiments)* **Carolin Moser / Markus Szaguhn**

Tuesday, July 02, 2024

08:45-09:00	Get together
09:00-10:00	*Keynote lecture* (Abstract p. 11) Systems Transformation as a Knowledge Problem: The Case of Energy Decarbonization **Prof. Dr. Clark Miller**, Global Institute of Sustainability and Innovation, Arizona State University, USA
10:00-11:30	*WS 1: Experiments (Part b: Living Labs)* **Manuel Jung / Stefan John**
11:30-12:00	***Coffee Break***
12:00-13:30	*WS 1: Experiments (Part c: Governance)* **David A. Martínez / Nex Bengson**
13:30-15:00	***Lunch break***
15:00-17:00	*WS 1: Experiments (Part d: Transformational Experiments)* **Giulia Volpini / Clemens Ackerl / Nina Maria Frölich**
17:00-	***Free Time***

Wednesday, July 03, 2024

08:45-09:00	Get together

09:00-10:00	*Keynote lecture* (Abstract p. 12) Whose transformations? Facing the justice challenge in rethinking cultures of research **Prof. Dr. Guido Caniglia**, KLI – Konrad Lorenz Institute for Evolution and Cognition Research, Austria
10:00-11:30	*WS 2: Values, normativity and modes of knowing (Part a)* **Oihana Iglesias-Carrillo / Helena Winiger**
11:30-12:00	***Coffee Break***
12:00-13:30	*WS 2: Values, normativity and modes of knowing (Part b)* **Niklas Wagner**
13:30-15:00	***Lunch break***
15:00-16:30	*WS 2: Values, normativity and modes of knowing (Part c)* **Blanca Luque / Max Braun**
16:30-17:00	***Coffee Break***
17:00-18:00	*Keynote lecture* (Abstract p. 13) Values, science, technology, and "development" **Prof. Dr. Helen Longino**, Department of Philosophy, Stanford University, USA
18:00-20:00	***Open Space***
20:00-	***Dinner***

Thursday, July 04, 2024

08:45-09:00	Get together
09:00-10:00	*Keynote lecture* (Abstract p. 14) The Knowledge Politics of Transformative Change **Prof. Dr. Harald Rohracher**, Department of Thematic Studies, Linköping University, Sweden
10:00-11:30	*WS 3: Political Ecologies* **Carmen Margiotta / Sahana Subramanian**
11:30-12:00	***Coffee Break***

12:00-13:30	Workshop on Transformation and Cultures of Research
13:30-	***Free Time***

Friday, July 05, 2024

08:45-09:00	Get together
09:00-10:30	*WS 4: Materialities* **Leman Celik / Pablo Lima**
10:30-12:00	*WS 5: Directionality / Transfer* **Max Priebe / Paul Moritz Wegener**
12:00-12:30	***Coffee Break***
12:30-13:30	Feedback Round Closing Ceremony

Systems Transformation as a Knowledge Problem: The Case of Energy Decarbonization

Speaker: Prof. Dr. Clark A. Miller

Institution: Global Institute of Sustainability and Innovation, Arizona State University, USA

Contact: Clark.Miller@asu.edu

A key problem of transformation confronting people and organizations today is the de-carbonization of energy systems and the consequent reconfiguration of interdependent critical in-frastructures, including food, water, transportation, the built environment, manufacturing, compu-ting, communication, and more. These systems are not simply technological systems – they are human systems. To date, however, relatively little attention has been paid to the epistemic dimen-sions of redesigning energy systems for a carbon-neutral future. In this lecture, I will map out the landscape of epistemic change now underway in decarbonization initiatives – centered in the pur-suit of carbon-neutral electricity systems but extending across society and the economy – develop a theoretical framework for analyzing systems transformation as a knowledge problem, and speculate about the implications for the future of science. While science has a long history, it's current epis-temic and institutional organization took shape amidst the early-to-mid-20th century industrial con-struction and elaboration of the large-scale socio-technological systems delineated above, e.g., as reflected in the formation of modern research universities and industrial research labs. It should not surprise us, therefore, that contemporary science is inadequate to the task of systems transfor-mation, which requires a different array of epistemic elements:

- Strategic futuring and worldbuilding as tools for imagining and mapping potential path-ways of transformation and socio-technological system outcomes.
- Comparative systems design as a key modality of future-oriented science, in comparison to now prevalent emphases on prediction and optimization
- Integration of the engineering and human sciences, in comparison to their now prevalent isolation in academic and professional epistemologies and organization
- Development of a science of interdependent systems dynamics, emphasizing tools for navi-gating complexity and uncertainty in processes of change, in comparison to the now preva-lent emphasis on element decomposition and optimization
- Collaborative, pragmatic, embedded research with systems managers and designers, in comparison to the university-centered research now prevalent

My talk will draw on insights from a 15-year program of engaged STS research on energy systems decarbonization. This research has been carried out in close collaboration with an interdisciplinary team of research colleagues and students in the human sciences, as well as with energy systems researchers and professionals and leaders policy, business, cities, and communities. This program has evolved using multiple research modalities, including embedded ethnography in low-carbon science and engineering research facilities; futures exercises to imagine, elaborate, and evaluate alternative possible systems configurations and transition pathways; critical analyses of the human dimensions of socio-technological systems transformations underway in contemporary low-carbon transitions; participation in urban, regional, and national decarbonization planning; research part-nerships with energy systems organizations to facilitate interdependent organizational and techno-logical transitions; and community-centered, community-driven collaborative experiments in alter-native energy system design.

Whose transformations?
Facing the justice challenge in rethinking cultures of research

Speaker: Prof. Dr. Guido Caniglia

Institution: KLI – Konrad Lorenz Institute for Evolution and Cognition Research, Austria

Contact: guido.caniglia@kli.ac.at

Transformation has become the new imperative of our times. On all fronts, we hear calls about the need to transform our societies, political systems, and ways of doing science. Yet, attempts to understand and pursue transformations are often uncritical towards fundamental ethical-political issues that characterize societal transformations. We tend to gloss over the contentious, divisive, conflictual, and non-neutral nature of such processes. Especially, we do not pay enough attention to issues related to (in)justice, inclusion, and marginalization of the most vulnerable, because of, for example, class, gender, ability and race. At the same time, we tend to privilege technical, deterministic, and technocratic ideas of transformation. And this is often true also for the kind of research processes and spaces used to understand and pursue societal transformations. In my lecture, I will argue that, unless our research efforts put equity and justice front and center, we will not be able to generate knowledge that may support just and equitable transformation processes. I will do so by addressing the question: How can research processes, cultures, and institutions contribute to fostering more just and equitable transformations?

I situate my approach to this question within so-called transdisciplinary and transformative sustainability science, an emerging field that explicitly aspires to contribute to sustainability transformations using collaborative and participatory methodologies. I will present three ongoing efforts to foreground justice and equity in the way we do research in sustainability science: (a) a major Horizon 2020 network project with more than 30 practice and research partners on transformations of land-use change across climate change and biodiversity (PLUS Change); (b) a COST Action including research from 27 European countries and aiming to overcome current fragmentation and marginalization of knowledge about sustainability transformations within Europe (TransformERS); (c) an upcoming ERC project aiming to understand sustainability transformations from the marginalized perspectives and practices of people with disabilities and people from gender and sexual minorities (WEIRD).

Relying on these three examples, I will use tools and considerations from multiple disciplines (such as philosophy, STS, and ethics) to reflect on the lessons learned from designing and implementing collaborative research that foregrounds issues of equity and justice. I will elaborate on the implications of these considerations for three main dimensions of research cultures dealing with transformation processes: (a) the capacities researchers need in order to navigate the ethical and socio-political complexities of transformative research and what this means for the training of early-career researchers; (b) the creation of research spaces and processes, that are inclusive, safe, and brave, beyond diversity-washing; (c) the changes that our research organizations, from research funders to universities and journals, should make to contribute to equity and justice.

I hope that this lecture will help the early-career researchers at the Summer School to find orientation, sustain determination, and develop the skill to understand and pursue transformative research critically and creatively with their work.

Values, science, technology, and "development"

Speaker: Prof. Dr. em. Helen Longino

Institution: Department of Philosophy, Stanford University, USA

Contact: hlongino@stanford.edu

A set of cognitive values often associated with modern science has been infused into conceptions not only of knowledge but of technology. This talk will explore those values, argue that they are not necessary features of science or of scientific knowledge. It will then explore how this conception of science is repressed in effort to transfer agricultural technologies from the industrialized (and wealthy) world to the industrializing (and poorer) parts of the world. I will conclude with comments about the socially embedded character of technology.

The Knowledge Politics of Transformative Change

Speaker: Prof. Dr. Harald Rohracher

Institution: Department of Thematic Studies, Linköping University, Sweden

Contact: harald.rohracher@liu.se

The need for social transformation has become a central theme in the debate on 'grand challenges' such as climate change, ecological issues ('planetary boundaries') or new technologies ('digitalisation'). This is also reflected in the development of political discourses and strategies, where concepts such as 'transformative innovation', 'mission-orientated innovation policy' or 'transition' have found their way into the political mainstream. This discursive shift also significantly affects research funding. In Sweden, for example, the national research plan is organised around the themes of grand challenges and researchers are expected to contribute to dealing with these societal problems and closely collaborate with non-academic actors such as municipalities to define problems and interpret outcomes with transdisciplinary methods and in processes of co-creation. In my talk, I will take up the case of urban low-carbon transitions as such a research field which closely interacts with policy makers and other societal actors and where social science research assumes different roles in terms of instrumental contributions to problem solutions, organiser and evaluator of co-creation processes (e.g. in scenario development or future labs), or critical partner contributing to greater reflexivity of the actors involved.

At the same time, a number of science studies scholars such as Bruno Latour, Isabelle Stengers and Donna Haraway have questioned this way of thinking about transformation as a 'grand narrative' potentially reinforcing the problems it is supposed to deal with. These researchers have articulated alternative ways of thinking about how to deal with the climate crisis (Haraway: 'staying with the trouble'). In my talk, I would like to take up these debates and pose the question of different concepts of transformation as 'knowledge politics', in which different concepts of transformation simultaneously express ideas about social futures, social power relations, ideas about human-nature relations but also ideas about science and thus become a political terrain themselves. Which implications would such an alternative conceptualisation of transformation have for 'cultures of research'?

Trust (in) the process? On conceptual and empirical entanglements of trust, artificial intelligence / machine learning, and smart grid development

Speaker: Clemens Ackerl

Institution: Institute for Technology Assessment and Systems Analysis (ITAS) at Karlsruher Institute of Technology (KIT), Germany

Contact: clemens.ackerl@kit.edu

My PhD project titled "Trust (in) the process? On conceptual and empirical entanglements of trust, artificial intelligence / machine learning, and smart grid development" examines the challenges arising from the implementation of AI- and ML-based practices the realm of energy grid operation. Specifically, I investigate the implications for established standards of decision-making traceability and comprehensibility, the increased complexity and need for coordination between grid operation layers, as well as the necessity of managing behavior profiles of the expanding set of actors. Perceiving these challenges as matters of trust for and within grid operation, my main research question is as follows: What is the role of trust in the development and embedding of AI-and ML-assisted socio-technical energy grid configurations and corresponding practices ("Smart Grid"), in particular on the grid operation layers?

To underscore the crucial role of trust in the on-going and envisioned to the energy grid, I mainly draw on technology assessment and energy policy discourses. Framing trust as both normative and emotional expectation, my dissertation project builds on the sociology of expectations as core conceptual framework. It is my aim to emphasize that the transformation of the energy production, dissemination, and consumption system is not a (purely) technical, but socio-technical undertaking with profound implications for our collective future.

Methodologically, I adopt a cumulative approach against the backdrop of the Socio-technical Integration Research (STIR) framework with its decision protocols, qualitative expert interviews, and document analysis. The empirical investigation focuses on the future energy systems research conducted at the Karlsruhe Institute of Technology, as well as on energy production/demand foresight, flexibility modeling, and responsive system design undertaken by grid operators. Laying the conceptual cornerstone for these empirical endeavors, I am currently working on a paper that develops an understanding of the interlinkages between conceptions of trust, of AI- and ML-assisted practices and of flexibility from a grid operation perspective.

While my dissertation focuses on the efforts of the German grid transformation, I acknowledge that these transformations may differ fundamentally in other (trans-)national contexts, e.g. in terms of technological foci and envisioned societal reconfigurations. Paying attention to these differences is closely linked to the transformative challenge of science, as they highlight the need for adaptable and contextsensitive scientific approaches to socio-technical developments. Hence, I'm looking forward to potentially discussing the tension between generalisability and context-specificity of research at the Summer School.

Lastly, I am very interested in discussing how tackling grand challenges such as the energy transition requires new forms of collaboration and knowledge production, both within and beyond scientific institutions – and inhowfar these challenges question the (negotiated/challenged) role of academic research as a transformational force.

Organizations of Patriotic Science: The Structural Form of the National University and the Production of Activist Science in the Philippines

Speaker: Nex Bengson

Institution: Leibniz Universität Hannover, Germany

Contact: nex.bengson@gmail.com

Organizational scripts have increasingly carved a particular niche among research agendas within higher education. Some notable examples within this stream include the global or world-class institutional model (Marginson, 2013, 2017, 2018; Mohrman et al., 2008; Salmi, 2009; Wang et al., 2013); the flagship university by Douglass (2016), and the civic university by Goddard et al. (2016). Their continuing relevance and the growing interest on these topics are both animated by the increasing pace of change in the social contexts that envelope postsecondary institutions and by the plethora of crises confronting societies worldwide. One particular organizational script that has escaped scholarly focus, however, is that of national universities. The lack of conceptual clarity and empirical analyses on this category is quite glaring given their frequent position at the apex of most higher education systems, pointing to their significance in terms of a country's representation and state-influenced development of science.

Among many considerations under this research agenda, this particular stream locates the national university within the realm of patriotic science (Fonseca et al., 2022; Rambukwella, 2023). The object in question is the production of activist-scientists that prioritize, produce, and mobilize knowledge in response to contemporary public issues. As Isopp (2014) notes, activistscientists do not conform to the "traditional scientific cultural norms of impartiality and neutrality," are often tied to "crisis situations," and challenges traditional conceptions of expertise. In direct contrast to universalistic constructions of knowledge, the actions of these epistemic subjects are likely to be locally situated and socio-politically inflected. The production of these personnel of patriotic science and their production with relation to the national university as a specific structural form or social machinery has not been extensively covered in science studies.

To further explore such phenomena, this research stream explores the interactions etween the national university and its nested organizations. The object of this study is AGHAM – Advocates of Science and Technology for the People (Agham is the Filipino or Tagalog word for science) which is constituted both by a professional association and a student organization with members and alumni mostly coming from campuses of the Philippine's national university, the University of the Philippines. The organization's activities in response to specific crises are examined with data coming from public statements, produced studies, member interviews, and other organizational artifacts. Doing so hopes to shed more light on this particular organizational script as a feature of contemporary knowledge production in a peripheral emergent context.

In the first paper under this research stream, the issue of political risk among these various organizations is examined. The analytical discussion centers on the interrelationships and dynamics between a national university and the mentioned organizations in how the former animates, legitimizes, and empowers the latter in challenging political-economic structures and interests. Findings suggest that, due to the nested relationships between these organizations, their exposure to political risk vary but is also at the same intimately connected. In effect, the mediated differences to political risk allow the

national university to accomplish one of its key roles in society through its organizational proxies but is also "shielded" from political controversy and institutional blowback.

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Conference Life: Face-to-Face Interaction in Scientific Communities

Speaker: Max Braun

Institution: University of Hamburg, Germany

Contact: max.braun@uni-hamburg.de

Participating in academic conferences is an essential feature of academic life. Most academics travel multiple times every year to academic meetings often via air travel, a practice that has recently come to be criticised for its carbon emissions in the context of global climatic change. The halt of the international conference circuit during the COVID 19 pandemic has seen a widespread switch to virtual meeting technologies but the return to face-to-face meetings suggests that they are not as easily replaceable by virtual alternatives as is sometimes assumed. While sustainability aspects and virtual meeting formats have become the focus of a self-reflexive discourse that is taking shape in numerous scientific communities (Braun & Rödder, 2021), from a sociology of science perspective academic conferences are a remarkably understudies topic. As ever wider aspects of scholarly life come to be seen through the lens climate concerns, with climate change seen as one of the main grand societal challenges of today, and as virtual technologies appear to make physical travel obsolete, academic conferences are located in the midst of transformation processes that span both science and society. Conferences have been conceptualised as privileged sites to study academic and professional communities (González-Santos & Dimond, 2015; Leivestad & Nyqvist, 2017; Söderqvist & Silverstein, 1994) as well as sites for the negotiation of academic authority (Friese, 2001) and knowledge production (Henderson, 2020; Gross & Fleming, 2011). Historically, conferences have been designed with implicit and explicit assumptions about forms of interaction and their epistemic consequences (Kotsou, 2023; Mead & Byers, 1968). However, research on conferences remains scattered and scholars in STS and in related fields have for the most part looked at written communication in science and at non-public interaction of scientists in laboratory contexts. My dissertation project aims to fill this gap by investigating academic conferences from an ethnographic perspective. I ask the question: What role do conferences play in the reproduction of academic communities? And more specifically: How do academic communities present themselves to themselves and to relevant social actors at conferences? In order to approach this topic, I employ a discipline comparative approach that investigates computer science, contemporary history, and earth sciences with regards to their respective conference cultures. Theoretically, I draw on the sociology of interaction, events, reputation and sociability (i.a., Durkheim, 2007; E. Goffmann, 1953, 1959, 1963 1967, 1972; A. Goffmann, 2019; Simmel, 1908; Collins, 2004; Fine, 2019) and the sociology of scientific disciplines, interaction among scientists and academic communities (i.a., Abbott, 2001; Lynch, 1985; Knorr Cetina, 1981, 1999; Stichweh, 1994; Whitley, 1982; Gläser, 2015). Methodologically, I draw on event ethnography (i.a., Aykut, Braun & Rödder, forthcoming) and problem-centred interviews (i.a., Witzel & Reiter, 2000).

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Infrastructures of Scientific Epistemologies: Data Practices and Knowledge Production

Speaker: Leman Celik

Institution: Ruhr-University Bochum, Germany

Contact: leman.celik@rub.de

The proposed doctoral project is part of a team research within the Collaborative Research Centre (SFB) 1567 "Virtual Lifeworlds". The title of the team research is „A02 Virtual Information Infrastructures: The Data Centre as Infrastructurer". The team research project approaches the relationship between scientific knowledge production and infrastructures as a crucial aspect of understanding how scientific studies are conducted. Understanding the socio-technical practices within a university data center and scientific data practices is essential to gain insight into the connection between nature and knowledge production. Through an ethnographic approach, the research analyzes the interdependence of socio-technical practices in a university data centre and scientific data practices, as well as the value chain from the extraction of raw materials and energy production to the operation and use of the data center.

As a sub-project of the team research, "Virtual Information Infrastructures," this Ph.D. project aims to investigate the relationship between scientific knowledge production and data infrastructures, exploring on the one hand how the data infrastructures are utilized and shaped by scientific practices in different scientific disciplines, and on the other hand, how data infrastructures shape scientific data practice and knowledge production. It sketches the contours of new forms of entanglements between knowledge production and planetary matter through data infrastructures. This, ties to the debates in STS and beyond on data infrastructures in and of scientific knowledge production, regarding:

- datafied knowledge production's contingency upon previous forms of knowledge production (Thylstrup et al., 2019);
- the variety of data vehicles and grounds for legitimacy in the circulation of knowledge (Leonelli and Tempini, 2020; Sørensen and Kocksch, 2021);
- the question of how the environment is known through data, and how evidence changes through different (large-scale) data practices, devices, and infrastructures (Beaulieu and Leonelli, 2022; Gabrys, 2016, 2020; Haider and Rödl, 2023; Hoyng, 2023; Nadim, 2016); as well as
- the conceptual shifts introduced through altering digital infrastructures (Canali and Leonelli, 2022; Plantin et al., 2018; Laser et al., 2023).

To do so, this study focus on three key theoretical empirical objects and the mutual shaping of data practices, data infrastructures and scientific knowledge production.

Focusing on these three empirical objects in research led to some questions about each:

a. Scientific data practices: What are the specificities of the scientist's data practices and how are they shaped in interaction with data infrastructure and scientific knowledge production?
b. Data infrastructures: What are the particular data infrastructures of the sciences and how are they shaped in interaction with data practices and scientific knowledge production?
c. Scientific knowledge production: How scientists achieve an outcome of their data practices? What is the particular knowledge production of the sciences and how is it shaped in interaction with scientific data practices and scientific data infrastructures?

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Towards a more inclusive and just transdisciplinarity– Challenges and implications for research

Speaker: Nina Maria Frölich

Institution: Institute for Technology Assessment and Systems Analysis (ITAS) at Karlsruher Institute of Technology (KIT), Germany

Contact: nina.froelich@kit.edu

Sustainability challenges, encompassing climate change, inequalities, and loss of biodiversity, demand transformative interventions on a system wide scale (Díaz et al., 2019; Ferrier et al., 2016). Transdisciplinary and participatory research practices have emerged as key approaches to tackle these issues (Becker, 2007; Kasemir, Jäger, Jaeger, & Gardner, 2003).

The PhD project is situated within such transdisciplinary research (TDR) and is underpinned by two central pillars. Firstly, it is aligned with the BMBF-funded project tdAcademy[1], focusing on societal and scientific effects within specific contexts and utilizing innovative formats and methods for knowledge production and problem-solving processes (Lam et al., 2021). The current phase, conducted in collaboration with the Oeko-Institute, aims to determine how different formats can be chosen and adapted across diverse contexts, synthesizing insights in a secondary analysis from the first project phase and incorporating capacity-building workshops.

The second pillar extends beyond the tdAcademy collaboration to provide a broader understanding of challenges in TDR. This includes a literature review of challenges in TDR, incorporating a specific examination of papers citing Lang et al. (2012). Implications for research practice and cultures are derived, utilizing workshops for collaborative development of insights and exploring context-sensitive approaches such as relational TD2[2].

The tdAcademy project incorporates four research institutes across Germany of which ITAS (Institute for Technology Assessment and Systems Analysis) is one. The tdAcademy itself aims to act as a platform for transdisciplinarity (TD) and according research is being conducted to further enhance the field.

Relational TD claims that solutions resulting from TD research need to be understood in relation to the conditions they have been co-produced within (Grauer et al., subm.).

The over-arching question and two sub-questions guide the research:

How can Transdisciplinary Sustainability Research (TDR) be advanced to bridge potential injustices within the research process and make the research process more inclusive?

1. What are the challenges of TDR with regard to integration across knowledge domains or unbalanced power relations? What development and injustices can be recorded? What impact do they have?
2. What are implications for research practices and cultures in TDR? How can context sensitivity be translated into according implications? How is the concept of e.g. relational TD aiming to make sure

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1 The tdAcademy project incorporates four research institutes across Germany of which ITAS (Institute for Technology Assessment and Systems Analysis) is one. The tdAcademy itself aims to act as a platform for transdisciplinarity (TD) and according research is being conducted to further enhance the field.

2 Relational TD claims that solutions resulting from TD research need to be understood in relation to the conditions they have been co-produced within (Grauer et al., subm.).

to integrate types of knowledge in more meaningful ways? What recommended set of actions can be concluded?

The project emphasizes that context sensitivity and a deeper understanding enable researchers to select appropriate formats, fostering impactful and just research. However, it acknowledges that TD does not automatically ensure equal power relations (Avelino & Wittmayer, 2016; Turnhout, Metze, Wyborn, Klenk, & Louder, 2020) or plural understandings of transformation (Grauer et al., subm.; Lam et al., 2020). The project aims to frame these patterns and derive implications for cultivating a new transdisciplinary research culture. Despite increased awareness of these challenges (Lam et al., 2020), my research seeks to fill the gap in implementing actions that prevent the reproduction of undesirable patterns such as power asymmetries or post-colonial structures.

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Situating Epistemic Opacity Beyond the Algorithms of Tinder: Sociotechnical Agnotology as a Challenging Research Strategy

Speaker: Oihana Iglesias-Carrillo

Institution: University of the Basque Country UPV/EHU, Spain

Contact: oihana.ic@gmail.com

This PhD research aims to understand and intervene in the order of love at the very beginning of the 21st century; where the subject-in-love is cyborg – without being cognizant. The main goal is to elucidate the very performative meaning of what I call love technologies. These emerging developments –within ICT, biotechnology, and AI– will constitute new sociotechnical complexities, more epistemic opacities, and thus new affective (in)justices. My proposal applies an anticipatory methodology, both hermeneutic and situated, to exhaustively show multiple alternative scenarios, expectations, and values possibly involved. This project offers a fertile field to open up loves, technologies, and futures. Now, under the school's concern of the transformation challenge, I shall adopt as my main task to situate the epistemic opacities of the dating app Tinder, through which the urge to rethink our research frameworks becomes evident.

There is growing worry about what the algorithmic model of Tinder hires (Aronson & Duportail, 2019). These processes, however, are company secrets. The current scientific literature on epistemic opacity tends to focus exclusively on the reliability of certain computational elements of a particular technology (Durán & Jongsma, 2021; Duede 2022), overlooking the relational dimension beyond (Yujov & Ypi, 2019; Alvarado, 2021). In the following, I interrogate several theoretical grounds through agnotology (Proctor 2020); that is, under the light of the unseen or ignored. Concretely, the myopia of the engineering object-oriented neutral-valued conception of technology (Kapp 2018). On top of unknown technological, scientific, political, economic, historical, and so on relations, the task is to question through a Foucauldian/postmodern-feminist characterization (Dorrestijn 2012; Braidotti 2016): What is the algorithm beyond the algorithm? What do we fail to see - what do we see in excess? What kind of sociotechnical constraints does Tinder spread? What kind of power/knowledge relations does it explicitly and implicitly support? How does it relate to the embodied knowledge? The hypothesis advances that exploring agnotological forces is an appropriate and disruptive attempt to account for the complexities of Tinder and the knowledge/power/affect production in our time.

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Living Labs: Science in multiple transformations

Speaker: Stefan John

Institution: RWTH Aachen University, Germany

Contact: stefan.john@humtec.rwth-aachen.de

The complexity of social transformation processes requires new or different action, knowledge and organisation (Pel et al. 2020) in a scientifically sound and democratically legitimised setting. Living Labs (LLs) are seen as promising platforms for transdisciplinary research with a transformative character to solve societal challenges. These new knowledge infrastructures (Bowker 2017) are in the focus of my dissertation. They represent a point of crystallisation for different developments in and around science and (its) transformation. In them, transformation of science, through exposure, different structures and actor constellations, transformation through science, by a transformative agenda and novel experiments, and science amidst (structural) transformation, through the focus on grand societal challenges, take place simultaneously.

LLs are places to produce relevant knowledge and simultaneous action for social transformations and should therefore be critically examined. Two aspects stand out, form a relevant research gap and correspond with the three aforementioned types of transformations. On the one hand, the (power) structure and its establishment through social contracting in LLs and, on the other hand, the (ideas of) experimentation as a mode of knowledge production play decisive and interwoven roles. These are dealt with in two publications, forming the backbone of the cumulative dissertation (one in review, one in the writing phase).

To address the first point and the questions whether projects with different leads show different "deals" between science and society (Lieven and Maasen 2007) and how the performative structuring of the knowledge infrastructure takes place, I analysed four LL case studies with different leads (university, civil society, city and industry) on the basis of qualitative interviews. They form, on the one hand, rather closed off spaces in which science for and in society is enacted by technology-oriented industry and university LLs, and on the other hand, in more open spaces where science with and by society is conducted in city and civil society run LLs.

The second point of analysis is experimentation in LLs, which is frequently mentioned as a core criterion. However, understandings on what experimentation is, presupposes and entails diverge. Yet these are fundamental for (co-)designing, (co-)producing or incorporating and validating other types of knowledge and cultures of research (Knor Cetina 1999). This raises the question which views on how to design and conduct experiments (co-)exist in LLs. To this end, I am studying the understandings of experiments in existing LLs at two technical universities in Germany. Based on two case studies in the field of urban mobility per university, I will explore the relation of the existing experimental ideas of different actors. Here further attention will be spent on their embedment and aspects of regional innovation within their understandings and possibilities of experiments.

Scaling public experimentation for a local mobility transformation

Speaker: Manuel Jung

Institution: Technical University of Munich (TUM), Germany

Contact: manuel.jung@tum.de

The climate crisis and a growing population in cities challenge the status of urban mobility. Living labs and test beds are considered key instruments for facilitating the envisioned mobility transformation. Using science and its experimental logic in public spaces, such forms of public experimentation test technologies and societal reactions to a potential future scenario (Engels et al., 2019; Marres and Stark, 2020). As scalable models, living labs promise to provide socially robust and more inclusive solutions by simultaneously inducing societal and technological change (Pfotenhauer et al., 2022). The proliferation of experimental mobility spaces indicates how public experimentation is becoming a scientific standard tool for addressing transformation processes in diverse contexts.

From a Science and Technology Studies (STS) perspective that foregrounds the context-dependency of socio-technical transformations, I investigate the mutual co-shaping of public mobility experimentation and local understandings of transformation. Based on empirical case studies of Munich's metropolitan region, I ask: How are mobility experiments discursively and materially proliferated to create a more desirable mobility future for Munich? How do experiments deal with the demand to be scalable while creating knowledge about and engaging in urban transformations? How do public experimentation as scientific activity and the local transformation context mutually co-shape each other?

Situated as an employee of the Munich Cluster for the Future of Mobility in Metropolitan Regions (MCube), I build on empirical case studies of experimentation in the Munich metropolitan region. The related empirical material consists of participatory observation of experimental activities, interviews with project members from universities, private partners, public administration, and civil society organizations, as well as of media and policy documents. In Munich, the MCube cluster experiments with various mobility visions. Living labs on car-reduced districts made headlines across Germany, while experiments on autonomous driving attracted widespread attention at the IAA trade fair. The different experimental projects foreground visibility and demonstration to make future mobility tangible while scientifically evaluating societal reactions and technological performance. The researchers' activities are not limited to conducting the experiments; as engaged scientists, they work as instructors, mediators, and fulfill networking tasks in the local mobility landscape. Due to the organizational structure of MCube, the experiments are inherently designed as scalable interventions, while the confrontation with the prototypical test spaces consumes considerable resources.

After all, building on the concept of responsible research and innovation (RRI) (Stilgoe et al., 2013), a better understanding of the co-shaping of public experimentation as engaged scientific activity and local transformation contexts can contribute to conceptualizing responsible mobility experimentation.

History and Philosophy of Mediterranean Earth System Sciences: 1970-2000

Speaker: Pablo Lima

Institution: University of Seville, Spain

Contact: plima@us.es

The topic of my PhD dissertation is the history and philosophy of Earth System Sciences in the Mediterranean Sea from the Post-WWII period to present days.

The general underlying hypothesis of my dissertation is that Mediterranean Earth System sciences build on the material interplay between measurements, data, models, and simulations to yield case-based narrative explanations that account for complex, historical and developmental processes of the ocean dynamics. I am currently looking into the discovery of some particularly relevant phenomena in the dynamics of the Eastern Mediterranean waters from the second half of the 20th century (1970s) up to present days, like the Eastern Mediterranean Transient (EMT). My initial focus is first to understand the epistemological significance of infrastructure and field work materialised in experiments undertaken by in-situ and satellite monitoring systems that portrayed these discoveries in the Eastern Mediterranean, like WOCE, POEM, MedArgo, POSEIDON, etc. Secondly, I aim to investigate how the local knowledge produced in this context scaled in such a way that helped to perceive the Mediterranean as a miniature ocean model for global oceanography.

Most of the primary sources I am currently working with are pieces of mediterranean earth sciences literature, from the second half of the 20th century onwards, that have been made publicly available via Scopus and similar search engines. Part of my job is to show how the oceanographic advances recorded in the literature are embedded into extensive technoscientific networks that, strategically located, have depicted the Mediterranean Sea as a tridimensional ever changing volume of water. Not only satellite monitoring systems, but perhaps the history of mediterranean vessels and expeditions is at stake, since for example, MedArgo buoys need to be physically deployed and surveyed.

The results of my research are expected to be mainly qualitative, but my primary sources are for the most part quantitative: available records of temperature, salinity, depth, conductivity, velocity, chlorophyll, biogeochemical tracers, etc. Thereby, in my research I am reflecting too upon the means of data production and practices, of which motley, multi-source oceanographic databases that combine proxy, historical and archival records are clear examples. I hope that the inquiry into the nature of data, its uses and its kinds, enriches the actual STS and philosophy of science discussions with valuable background questions about the tensions between historiographic and scientific narratives, qualitative and quantitative representations, etc.

Naturalism reconsidered: A proposal rooted on 19th scientific philosophy

Speaker: Blanca Luque Linero

Institution: University of Lisbon, Portugal

Contact: pandelirios@hotmail.com

In the middle of the twentieth century, naturalism was born as a new philosophical approach claiming to keep philosophy closer to science. In general, from an epistemological approach, naturalism defends the continuity between scientific results and practices and philosophical study, rejecting the search for the traditional foundation of knowledge, based on the use of rational reconstructions and a priori methodology.

However, the multiplicity of perspectives and conceptions that are considered naturalistic makes it difficult to characterize it, filling us with uncertainty about what it means to be naturalistic. In my dissertation I propose to analyze the possible existence of a link between naturalism and nineteenth-century thought, which may shed new light on the naturalist problematic today, whose importance is linked to the role and status of science nowadays.

In order to do that, my dissertation is divided into three parts. The first deals with the state of naturalism today. The second deals with the theory of knowledge implicit in the work of some nineteenth-century philosopher-scientists. Normally, these authors were situated within the positivist tradition, understood as a defence of pure empiricism. However, a reinterpretation of this period can show that philosophy and science worked together, as the case of authors such as Auguste Comte (1798-1857) or Ernst Mach (1838-1916) shows. The third part will consist of the elaboration of an original naturalistic proposal based on a back-and-forth relationship between the first and second parts.

The presentation of the main ideas will be more focused on the first part. I will approach the debate on current naturalism by situating its beginnings in Quine's proposal presented in Naturalized Epistemology (1969), and establishing a dialogue with other perspectives coming from other branches, such as the evolutionary, historical, social and feminist ones. In general, these considerations have pointed out the importance of the cognizing subject for the study of knowledge as well as its biological, historical and social situation. However, different perspectives have different ways of rejecting rational reconstructions and characterizing knowledge. While evolutionary perspectives, for example, focus on the cognitive mechanisms like an evolutionary product, others have emphasized the role of social contexts in the production of knowledge, and still others defend an interdisciplinary approach. Addressing this debate can help us to clarify the situation of naturalism today and shed light on how a naturalistic epistemological position can address philosophical approaches to science getting closer to real scientific practice.

Changing social and cultural values of nature: Exploring plural values of human-nature relationships in glacierized environments (NaturICE)

Speaker: Carmen Margiotta

Institution: Lunds Universitet, Sweden

Contact: carmen.margiotta@LUCSUS.lu.se

As glaciers retreat at unprecedented rates, mountain ecosystems are altered, and with them communities. A trans-regional multi-case study, Lund University's research project NaturICE aims to assess and examine how values and human-nature relationships are affected by glacial changes. NaturICE primarily focuses on Scandinavia and the Hindu Kush Himalaya, but wishes to integrate knowledge from other areas of the world, namely the Andes and the Alps.

Within NaturICE, I focus on the subjective experiences of glacial change. In particular, my research questions investigate in what ways different cosmological worldviews determine how people relate to glaciers and glacial change, and what are the impacts of glacial retreat on human subjectivities and community identities. Using a mixed methods approach, which combines surveys, semi-structured interviews and focus groups, as well as more engaged research methods like participatory art, participatory geographical information systems (PGIS), and transect walks, I aim to document the spiritual and cultural significance of glaciers across different contexts affected by glacier loss.

Exploring the Nexus: Open Anticipatory Governance in Nanomedicine A Comprehensive Analysis and Framework Evaluation

Speaker: David Álvaro Martínez González

Institution: Universidad del País Vasco/Euskal Herriko Unibertsitatea, Spain

Contact: davidalvaro.martinez@ehu.eus

This presentation scrutinizes the interplay between the application of a case study on open anticipatory governance in the realm of nanomedicine and its corresponding theoretical framework. It assesses both the divergences and alignments between a contextualized methodology (to a specific setting) and a broader approach (to knowledge production). Thus, some key issues that will be discussed can be articulated through the following questions:

- To what extent can an experience framed within specific space, conditions and problems be replicated in other contexts?
- In what aspects might it differ from other experiences within an anticipatory governance framework, and to what extent can it modify the preceding theoretical methodology of (open) anticipatory governance?

To address these points, the open anticipatory governance framework is introduced as a dynamic compilation, drawing from varied perspectives over time (Barben et al., 2008; Guston, 2014; Ramos, 2014; Rodríguez, Urueña & Ibarra, 2020). Subsequently, the course and findings of a nanomedicine-focused knowledge co-creation experiment in Barcelona are presented (Martínez, Ibarra & Brasó, 2024), contextualized through comparisons with similar initiatives. This leads to an exploration of the 'nexus' between these elements, discerning conceptual tensions, practical limitations, or benefits that unfold during the experiment. In this manner, the intention is to address general issues of interest related to contemporary transformations in the production of knowledge.

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The role of real-world laboratories in transformation towards sustainability: between cross-case learning, infrastructures and potential impact

Speaker: Carolin Moser

Institution: Institute for Technology Assessment and Systems Analysis (ITAS) at Karlsruher Institute of Technology (KIT), Germany

Contact: carolin.moser@kit.edu

As a research approach, real-world laboratories have gained popularity and awareness in various research communities (e. g. Kampfmann et al, 2022) such as sustainability research, environmental research and urban research in recent years. By using a transdisciplinary framework, actors outside academia are involved in the research process from an early stage onwards in order to establish and promote a purposeful, sustained and lasting mutual learning process (Lang et al., 2012; Marg & Theiler, 2023). Transdisciplinary research (TDR) intends to "integrate the best available knowledge, align values and preferences, and create ownership of problems and solution options" (Lang et al., p. 25). By bridging the gap "between problem solving and scientific innovation" (ibid. p. 40), TDR aims to address the complex challenges of today's global society in a comprehensive manner.

TDR differs from disciplinary research with regards to their specific characteristics in terms of scientific knowledge production (Marg & Theiler, 2023). Despite their prominence in some disciplines, real-world laboratories as transdisciplinary approaches may complement and potentially challenge established cultures of research.

Representatives and advocates of real-world laboratories postulate that an ideal real-world laboratory can act as an experiential space in the real world to provide a research infrastructure that enables experimentation of solutions, production of actionable knowledge for transformation processes as well as the ability for decision-making on problems that may affect society as a whole (Lang et a., 2012; McCrory et al. 2020).

Over the last years, we have experienced an increase in the number of real-world laboratories that have been funded and implemented. However, most real-world labs are only established for a limited period of time, and the knowledge produced is always highly contextualized (Lam et al., 2021; Marg & Theiler, 2023). This raises questions about the impact of these transformative labs and their tangible effects on societal change. While some approaches to impact and different types of assessment in real-world laboratories as TDR-approaches have been suggested in recent years (Luederitz et al., 2017; Defila & Di Giulio, 2018; Kampfmann et al., 2022; Bernert et al., 2023), we are still lacking a broader cross-case learning approach that links the specifics of real-world research with a perspective on how to systematically grasp and measure the overall impact of real-world laboratories in transformation towards sustainability.

My research therefore aims to investigate current real-world lab research further by asking: What elements, conditions or context factors support real-world laboratories in unfolding a lasting impact, and which success factors can be formulated to identify and understand the diverse forms of impact they may have in both science and practice? In a first step, I will approach this research focus with a systematic literature review to summarise already identified success factors of impact. Further I will contribute to the set-up of a database to enhance the basis of understanding and evaluating real-world labs as transdisciplinary approaches in both societal and scientific progresses (e. g. Jahn, Bergmann & Keil, 2012; Marg & Theiler, 2023).

Co-Creating Futures: Directionality in the Making

Speaker: Max Priebe

Institution: Radboud Universiteit, The Netherlands

Contact: max.priebe@isi.fraunhofer.de

Background

Science, technology and innovation (STI) policy after the 'normative turn' rejects the idea of promoting just any innovation. This claim has increasingly been endorsed by scholars of innovation governance and has reinvigorated discourse on the purpose and direction of the state's promotion of STI. It is said that STI policy now aims to "contribute to a specific direction of transformative change" (Weber and Rohracher, 2012, p. 1042). Despite of the acknowledgement that trajectories of change in STI are never inevitable, but rather contingent (Bijker and Law, 1992), research on STI policy has recently suggested that directionality can be produced to help bring about transformative change and strategic convergence in the promotion of STI (Wanzenböck et al., 2020; Janssen et al., 2021). Various practices at the science-policy-society interface experiment with the ways in which knowledge and technology are produced and embedded, thereby not only transforming science but also scientizing transformations.

Concepts such as transformative innovation policy or mission-oriented innovation policy have shaped policymaking and attracted the attention of scholars from STS and transition studies. To date, however, the academic discourse on directionality has remained largely conceptual. Few empirical studies have been published (Haddad et al., 2022). Despite the recognition that directionality, like innovation itself, is highly dependent on and situated in regional innovation systems (Uyarra et al., forthcoming; Bugge et al., 2021) and specific cultures of innovation (Pfotenhauer et al., 2023), there is a lack of context-sensitive research.

This research gap is the starting point for my PhD. Under the working title "Co-Creating Futures: Directionality in the Making" I assess rare empirical cases, in which directionality has been researched. This may involve questions around the role of different actors in the making of directionality (Parks, 2022), challenges to directionality (Bergek et al., 2023) the multi-sited political space in which directionality is negotiated (Priebe and Herberg, forthcoming). The research explores connections towards prevailing accounts such as the opening-up of STI (Stirling, 2008), systemic perspectives on innovation policy (Kuhlmann et al., 2010) or the reflexive governance of STI (Bauknecht et al., 2006).

Methods and Theoretical Approaches

I contribute a practice-theoretical perspective to studies that research how STI policy aims to produce directionality. The aim here is to understand directionality not as something structurally inherent to STI governance, nor as something that emerges from policy texts. Rather I propose to understand it as something that people do. Actions that span over different fields, from science, over policy to the realms of economy and culture, connecting different actors such as scientists, "visioneers" (McCray, 2013), bureaucrats and intermediaries. Consequently, I study social practices such as negotiation, translation or placemaking in the context of strategic meetings, public consultations, living labs or foresight processes. I produce and review empirical material and integrate these different contributions into a practice-theoretical framework for researching directionality in the making.

Selected Research Questions

What are the practices that constitute (or dilute) directionality in the making? --> How do they affect cultures of research?

Who are the actors or practitioners involved in the making of directions for STI (in public policy, science, society, private sector)? --> What political spaces and publics emerge from these practices?

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Creating a Transformative Study of Society-Glacier Interactions

Speaker: Sahana Subramanian

Institution: Lund University Centre For Sustainability Studies (LUCSUS), Sweden

Contact: sahana.subramanian@LUCSUS.lu.se

I am a first-year doctoral student in the NaturICE project at Lund University Centre for Sustainability Studies (LUCSUS) which investigates the plural values inherent in society-glacier interactions and how these interactions are affected due to climate change and the ensuing glacier retreats. Specifically, my focus lies on studying the interactions between climate change, glacier melting, and the larger political economy in the Hindu Kush Himalayan (HKH) region. Empirically, I will study the globalising tourism economy and its influential role in the changing 'climate-political economy' nexus.

My research questions are broadly along the lines of: what are the interactions between climate change, glacial retreat, and political economy in the HKH region; and how is it changing? What is the role of the globalising tourism economy in the changing climate-political economy nexus? How are these changes distributed and differentiated across social differences such as gender, caste, religion, and socioeconomic dimensions?

Glacier melting and retreat are conventionally framed as issues for the physical sciences and are aligned with the goals of positivist inquiry. As my research is grounded in sustainability science, my approach requires transdisciplinarity, plurality, and critical social sciences. I intend to use critical realism as the philosophical underlabourer for my doctoral research as it lends itself to a plurality of methods and theories; and has emancipatory and transformative potential (Bhaskar, 1989). This represents a transformation in the conventional epistemological and ontological choices commonly employed in glacier studies. According to critical realist traditions, observations can be value-laden; therefore, I will use the taxonomy of plural values (Arias-Arévalo et al., 2018) as my theoretical framework to capture societies' changing values attributed to a changing glacial landscape and political economy (Sayer, 2000). In tandem, I will use concepts from political ecology, to understand the climate-political economy nexus with a justice lens. Critical realism enables the use of interdisciplinary and mixed methods (Cockburn, 2022), and thus I will use an 'intensive research design' that can include interactive interviews (participant observation, participatory art or GIS), ethnography, and qualitative analysis.

I also intend to be transformative in my research and rethink glacier science by practising decoloniality in my research. The HKH region has been subjected to colonial extractivism of both knowledge and resources. Therefore, it is important to be consistently reflective of my positionality while doing research in the region, intentionally cite and collaborate with local scholars leading to the co-production of knowledge, and actively centre the research in the local socio-historical context. Decoloniality challenges Western euro-centric knowledge production and thus, by being decolonial with my research, it is possible to observe a transformation through science; especially in the way we think about glaciers and the Himalayan region as more plural rather than static.

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The transformation challenge: Re-Thinking cultures of research

Speaker: Markus Szaguhn

Institution: Institute for Technology Assessment and Systems Analysis (ITAS) at Karlsruher Institute of Technology (KIT), Germany

Contact: markus.szaguhn@kit.edu

The advancing climate crisis (IPCC 2023) requires a far-reaching socio-ecological transformation in all areas of society (WBGU 2011). In recent years, real-world laboratories (RwL) and living labs have increasingly been established to develop and test solutions to pressing real-world problems (Parodi et al. 2023). RwLs offer a permanent infrastructure for transdisciplinary and transformative research - characterized by the cooperation between scientific and non-scientific actors, aspiring research, educational and practical objectives. The central element of the realworld laboratories are real-world experiments in which the actors cooperatively initiate and evaluate changes towards sustainable development.

The dissertation project focuses on the question of whether and how transformative learning and teaching formats with real-life experiments contribute to strengthening the climate protection skills of their participants.

The cumulative doctorate and is partly related to the nationwide climate protection format #climatechallenge (#cc), which provides the real-world research context. The #cc consists of two real-world experiments with the aim of (1.) reducing the individual carbon footprint (footprint challenge) and (2.) getting to know and testing collective options for action for public transformative engagement at the level of the handprint (handprint challenge).

The research interest of the doctorate, which is affiliated with the Karlsruhe Transformation Center for Sustainability and Cultural Change at ITAS, focuses on the following studies:

- Connections between individual and collective climate protection and transformation approaches, which are differentiated according to the concepts of the socio-ecological footprint and handprint. From the perspective of real-world laboratory research, the handprint has not yet been theoretically substantiated and is to be introduced into the debate through a praxeological approach (Shove et al. 2012).
- Development and critical reflection of the monitoring and evaluation concept of the nationwide climate protection education project #climatechallenge.
- Analysis of transformative learning processes in learning and teaching formats with real-life experiments such as #cc, which contribute to a change in the so-called meaning perspectives of the participants on their own role in climate protection.
- Application of transformative learning and teaching formats with real-life experiments in education for sustainable development in in-service university teaching, as a contribution to necessary transformation processes and cultural change (change management) in companies, as well as exploratory impact evaluation of the experiment.

I believe, the scope of my PhD aligns well with the topic of the Summer School. Real-world experiments can provide a fruitful environment for analyzing cultural change in research. In transformative and transdisciplinary experiments, it can indeed be observed that different cultures of knowledge can contribute to controversy and polarization – but also help understanding complex problems to collectively creating robust solutions. As a participant, I would like to bring up these positions and participate in re-thinking knowledge cultures.

Co-producing knowledge, accelerating transitions! Lessons from intervention research in experimental and participatory projects for the agro-ecological transition

Speaker: Giulia Volpini

Institution: INRAE Institute, France

Contact: giulia.volpini@inrae.fr

Over the coming decades, society will have to face main societal challenges, first of all climate change. Particularly, agroecosystems are central for sustainable transition because of their vulnerable situation, as well as their influence on the environment. Therefore, innovative experimental projects based on collective and participatory initiatives and agroecological practices are arising and spreading in order to tackle these societal issues (García-Llorente et al., 2019). A vastly diffused model is the one of "Living Lab". It defines an organisation of actors engaged in an innovation process, which grants a central position to users and exploits a real-world setting to host co-creation projects among scientists, public decision makers, private sector and citizens (Toffolini, 2020). These projects based on purposive experimentation and collective action promise to accelerate transformative change, fostering rural development and climate change adaptation (Schaffers & Kulkki, 2007; von Wirth et al., 2019). Nevertheless, at present, little is known about how living labs deliver on their promise because their actual contribution to the intended transformations has so far been little studied (Bronson et al., 2021).

During my PhD, I conduct an intervention research, co-experimenting a formative assessment methodology in two main French research programs, Occitanum and TETRAE. Occitanum is an ecosystem of Living Labs, set in the southwest of France aiming at mobilising digital technology for the agroecological transition and the territorialisation of food production and consumption. TETRAE is a research programme that aims to stimulate projects based on partnerships with local actors to meet the major agricultural, food and environmental challenges specific to each region, by placing the territorial dimension at the heart.

This research proposes to analyse how the ASIRPA real time approach (Matt et al. 2023) could contribute to fill this knowledge gap. ASIRPArt is a formative assessment methodology that helps research projects to amplify their impacts towards desired societal futures and navigate uncertainty. Its objective is to guide the innovation process to determine whether expected transformations are taking place and to adjust iteratively ongoing experiments, while enhancing actors' learning in a continuous process (Bhat, 2019; Joly et al., 2019; Matt et al., 2023). Therefore, my research question is: How can formative evaluation contribute to the adaptive management and reflexive monitoring of participatory research and development projects aimed at the agro-ecological transition? In order to be able to address this question, I conduct participatory workshops and semi-structured interviews with the participants of the projects and I mobilise Actor-Network Theory (ANT) as theoretical framework, as this approach allows to study how networks of human and non-human actants articulates to foster innovation as a process (Akrich et al., 1988).

I believe that my PhD study fits in the program of the Summer School as it tackles two of your core themes: transformation of science and transformation through science. Indeed, Living Labs are considered as a new way of doing research, experimenting in real life contexts and considering users not only as an object of investigation but as key players in the innovation process (Dubé et al., 2014).

At the same time, these experimental and participatory research projects, guided with the ASIRPA methodology, attempt themselves to provoke transformations in the agricultural sector.

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The Legitimacy of Science Policy Interfaces in the Environmental Sustainability Context

Speaker: Niklas Wagner

Institution: University of Bonn, Germany

Contact: wagner@uni-bonn.de

Dear organisers of the Summer School

I am writing to apply for the "The transformation challenge: Re-Thinking cultures of research" summer school. My name is Niklas Wagner, and I am a doctoral student at the One Health and Urban Transformation Graduate School at the University of Bonn's Centre for Development Research where I am doing my PhD in the field of knowledge sociology on the legitimacy of science-policy interfaces (SPIs) in addressing climate change. In this short letter of motivation, I want to lay out how my thinking about knowledge, science and transformation developed throughout my cumulative dissertation journey by summarising my (planned) publications.

1. Systematic Literature Review on SPIsi: This article summarises the literature on the effectiveness of SPIs in the environmental sustainability context identifying factors related to credibility, relevance and legitimacy. We show how the literature criticises linear models of science policy interaction calling for more co-production.
2. Theoretical Framework on the Legitimacy of SPIsii: This article, currently under review, argues that SPIs for sustainability are against the popular conception more than policy-neutral but are powerful institutions shaping transformation. Arguing that this power is not per se bad but needed for necessary transformations we argue for legitimate SPIs, identifying 17 criteria spanning input, throughput, and output dimensions of legitimacy.
3. Legitimacy of Urban Climate Action Plans: I am applying the framework above empirically by studying the creation of urban climate change plans in São Paulo, Accra, Ahmedabad, and Bonn, dominantly through interviews with different stakeholders to understand how knowledge and policy interact in urban transformation.

1. Legitimacy of UNFCCC Global Stocktakeiii: Next to the creation of climate action plans, I am using the framework above to analyse the legitimacy of the creation process of the technical summary of the Global Stocktake under the UNFCCC bringing together policy makers, civil society and scientists.
2. Systems Approach on IPCC and UNFCCC: Recently fascinated by postcolonial and feminist critiques of modernity's conception of science, I utilize a systems theory to explain the failure of the IPCC and UNFCCC to overcome the systemic challenges in reconciling the linear, Eurocentric logic that dominates these them.

I am keen to further develop my theoretical perspective on cultures of research and knowledge production through discussions at the summer school. My research on SPI legitimacy in cities of the Global North and South would benefit from situating it within broader conversations on epistemic injustice and representation in science. I look forward to learning from leading scholars, receiving feedback on my project, and exchanging ideas with fellow PhD students on reforming cultures of research for sustainability transformation.

Measuring the Impact of Research and Knowledge Transfer Projects: Development of integrative Metrics for the Expansion of the Current ResearchInformation System Bay.FIS at the Weihenstephan-Triesdorf University of Applied Sciences

Speaker: Paul Moritz Wegener

Institution: Weihenstephan-Triesdorf University of Applied Sciences, Germany

Contact: paul.wegener@hswt.de

The research landscape is facing increasing societal and economic challenges, especially in publicly funded institutions such as universities. In a transdisciplinary research environment, knowledge transfer is becoming a crucial task alongside knowledge generation. The term 'knowledge' is a valuable intangible asset, not only in academia but also in business, politics, and civil society. It is worth noting that the term 'innovation' is significant in the context of knowledge transfer. Innovations, which are distinguished by their societal impact, differ from inventions, which require economic action to be significant. Universities aim to gain societal legitimacy by demonstrating impact and benefits, which are crucial for securing funding. However, operationalizing this goal remains challenging. Traditional research evaluation emphasises scientific impact, which marginalises scientific innovations. Scientific innovation occurs in novelty-driven social contexts and provides unique insights into knowledge production. Institutions need to adapt their evaluation systems to focus on scientific innovation, impact and societal benefit in the face of growing stakeholder interest. For research and knowledge transfer projects, it is essential to develop a metrics system that captures these impact factors. Working with external partners provides valuable interfaces for generating and disseminating knowledge, particularly in applied research universities. Current Research Information Systems (CRIS) focus on scientific outputs, yet their potential is underutilised. A holistic assessment of research activities, improved decision making, enhanced science communication, strategic planning and improvement, and the promotion of transparency and accountability can be achieved through a metrics system with impact measurement. The PhD project aims to answer the following research questions: (i) What indicators and criteria can be used to measure the impact of research and knowledge transfer projects at universities? (ii) How can scientific participation and Campus-Community Partnerships (CCP) be integrated into existing university management systems to enhance knowledge transfer? The project aims to develop and integrate a metrics system into the existing CRIS, Bay.FIS, at Weihenstephan-Triesdorf University of Applied Sciences. The methodological approach involves a case study that utilizes the university's network for expert interviews. The work packages include research and literature review, methodology development, material and data collection, analysis, and development of impact metrics, as well as an application and evaluation phase. The dissertation project is scheduled to begin in January 2024 and conclude in January 2027. Its objective is to provide university management with an integrated measurement tool through Bay.FIS, promoting transparency and accountability. While conference presentations are not currently planned, participation and publication in scientific journals are encouraged. Furthermore, participation in teaching and informational events in science management is being considered between 2024 and 2026.

Norms in Science, Technology and Society

Speaker: Helena Winiger
Institution: ETH Zürich, Switzerland
Contact: helena.winiger@usys.ethz.ch

My doctoral project "Epistemic norms in socio-technical systems" outlines a system- and actiontheoretical approach to the study of norms in science and technology and their embeddedness in society. It is located in the research project "Investigating interdisciplinarity and transdisciplinarity: intersections of practices, culture(s) and policy in collaborative knowledge production (INTERSECTIONS)» at ETHZ.

INTERSECTIONS analyzes intersections between knowledge cultures, research practices, and policy processes engaged with interdisciplinarity (ID) and transdisciplinarity (TD) in Switzerland. On the one hand, it aims at a broader integration and impact of ID and TD in science, technology, and society to address scientific and societal challenges. On the other hand, it addresses the causes of undone science by identifying and studying underlying sociocultural patterns of scientific processes, that are revealed in such intersections.

Although my doctoral project is cross-disciplinary, it is anchored in Science and Technology Studies (STS). It studies the central role of epistemic norms in socio-technical systems with a focus on inter- and transdisciplinary research practices of technical domains. It will further investigate, how an in-depth understanding of such norms can lead to an improved foundation of inclusive governance mechanisms in R&D processes, e.g., in the case of emerging technologies.

The universal role of norms is acknowledged throughout science and technology. However, the understanding of norms in epistemic contexts is still fragmented. Norms are studied in various disciplines such as psychology, philosophy, or economics, and mostly applied to specific research foci. A grounding of the study of epistemic norms in STS and ID/TD seems reasonable since this addresses the universality and applicability of norms. It opens up a room for discussions inviting all disciplines as well as non-academic societal members to exchange views and findings.

Norms will be focused on to target gradations of system-theoretical causes and actiontheoretical reasons for behavior in science and technology cultures on institutional levels. It will be explored how this situatedness and role of norms is to be conceived, which forms and functions it implies and can provide, and how they can be translated into tools to inform science and policy processes botom-up. It will be studied how existing institutional epistemic norms lead to a disciplinary normalization in science and technology, and, in consequence, to undone science.

In the dissertation, qualitative methods are used. An ethnography in an inter- and transdisciplinary research center will be carried out over at least one year, with participant observation, semi-structured and in-depth interviews as key methods. This research center is gathering multinational companies, universities, as well as federal research bodies. It has the objective to design and discover novel materials using high-performance computation and is hence thought to be informative regarding the observation of norms in socio-technical systems.

Prof. Dr. Clark Miller
Global Institute of Sustainability and Innovation, Arizona State University, USA

Clark A. Miller is a theorist and designer of techno-human futures in the School for the Future of Innovation in Society at Arizona State University, where he is Professor and Director of the Center for Energy & Society. His work explores how the decarbonization of the global economy can be leveraged as an instrument of human progress and uplift at this critical moment in history. He served on the US National Academies committee on accelerating decarbonization in the United States; advises cities, communities, utilities, and national laboratories on advancing energy and environmental justice; and was a juror for the Land Art Generator Initiative's 2022 Beautiful Forms of Energy competition. His writings include Accelerating Decarbonization of the United States (2023), Pathways to a Carbon Neutral Arizona Economy (2022), Cities of Light (2021), The Weight of Light (2019), Designing Knowledge (2018), Science and Democracy (2015), The Handbook of Science & Technology Studies (2015), The Practices of Global Ethics (2015), Nanotechnology, the Brain, and the Future (2013), Arizona's Energy Future (2011), and Changing the Atmosphere: Expert Knowledge and Environmental Governance (2001). His holds a BS and PhD in electrical engineering.

Prof. Dr. Guido Caniglia
KLI – Konrad Lorenz Institute for Evolution and Cognition Research, Austria

Guido's research aims to contribute to the development of new collaborative research approaches in sustainability science, variously defined as transdisciplinary sustainability research and knowledge co-production. He deals with interrelated epistemological, methodological, and ethical questions that emerge in these approaches. Guido develops his work in collaboration with interdisciplinary researchers from the natural and social sciences. Since 2018, Guido is the Scientific Director of the Konrad Lorenz Institute for Evolution and Cognition Research in Klosterneuburg (Austria). Previously he held a Marie-Curie post-doctoral fellowship in the Faculty of Sustainability at Leuphana University of Lüneburg. He earned a PhD in Philosophy from the University of Florence (Italy) in 2010 while working in academic communities in Italy, Germany, Spain, and the United States. In January 2016 Guido obtained a second PhD in Biology, from the Center for Biology and Society at Arizona State University (USA). From 2011 to January 2016 he also worked in the Global Classroom Project, a transnational partnership between Arizona State University and Leuphana University engaging in curriculum reform for higher education for sustainable development.

Prof. Dr. em. Helen Longino
Department of Philosophy, Stanford University, USA

Helen Longino is C. I. Lewis Professor in Philosophy, emerita, at Stanford University and a Fellow of the American Academy of Arts and Sciences. Her teaching and research interests are in philosophy of science, social epistemology, and feminist philosophy. In addition to many articles, Longino is the author of Science As Social Knowledge (Princeton University Press, 1990), The Fate of Knowledge (Princeton University Press, 2001), both of which explore the social character of scientific knowledge, and Studying Human Behavior, a study of the relationship between logical, epistemological, and social aspects of behavioral research (University of Chicago Press, 2013). Her current research includes a study of the role of conceptions of scientific knowledge influencing agricultural development and an in depth study of the concept of interaction in science and philosophy.

Prof. Dr. Harald Rohracher
Department of Thematic Studies, Linköping University, Sweden

Harald Rohracher is Professor of Technology and Social Change at Linköping University, Department of Thematic Studies, since 2012. He has been co-founder and director of the Inter-University Research Centre for Technology, Work and Culture (IFZ), Graz, Austria (1999-2007), Joseph A. Schumpeter Fellow at Harvard University (2009-10) and Simon Visiting Professor at Manchester University (2013). In his research he is interested in the governance of transformative socio-technical change, innovation policy, and urban low-carbon transitions.

Dr. Bettina-Johanna Krings
Institute for Technology Assessment and Systems Analysis (ITAS) at Karlsruher Institute of Technology (KIT), Germany

Scientific Degree: Master of Art, M.A. in Political Sciences; PhD (Dr. phil.) in Sociology. Previous Positions: Scientific Referee at the German Foundation of the International Development (1991-1992); Scientific Referee at the Ministry of Cultural Affairs in Buenos Aires, Argentina (1992-1994). Since 1998 Senior Scientist at Institute of Technology Assessment and Systems Analysis (ITAS), Karlsruhe Institute of Technology (KIT); 2009-2019: Co-Head of Research Department: Knowledge Society and Knowledge Politics and ITAS (KIT); Since 2020: Responsible coordinator for teaching "Technology Assessment" at KIT; Speaker of the topic: Work and Technology at ITAS (since 2009). Deputy Speaker of the Topic: Technology and Work in the KIT Program "Humans and Technology" (since 2014).

https://www.itas.kit.edu/english/staff_krings_bettina-johanna.php

Prof. Stefan Böschen
C:o/re and HumTec, RWTH Aachen, Germany

Stefan Böschen is the Chairholder for the research and teaching field "Society and Technology" at the Human Technology Center (HumTec), RWTH Aachen University. He is also Director of the Käte Hamburger International Center „Research Cultures" and Spokesperson of the HumTec, RWTH Aachen University. At the same time he is the Rector's Delegate for the Leonardo Project at the HumTec, RWTH Aachen University.His main research interests focus around: Science and Technology Studies,Technology Assessment, collaborative research and innovation action, and Knowledge and Democracy.

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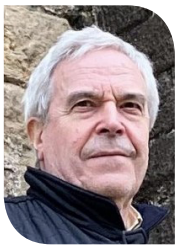

Prof. Andoni Ibarra
Department of Philosophy, University of the Basque Country, UPV/EHU, Spain

Andoni Ibarra is Professor of Philosophy of Science at the University of the Basque Country (UPV/EHU). He is also the Principal Investigator of PRAXIS Research Group, the founder of the Miguel Sánchez-Mazas Chair, which main goal is to promote Science, Technology and Innovation Studies; He is the Editor-in-Chief of Theoria. An International Journal for Theory, History and Foundations of Science. Andoni's main line of research is on the performative character of scientific representations in the constitution of the world. More particularly, he has focused on offering concepts of representation not reduced to structural preservation, the relational perspectives for assessment of science and technology based on the connectivity of their practices, the articulation between different types of knowledge in the interaction knowledge-communication-interculturality and, in recent years, on the inclusivity of actors in the governance of responsible innovation as well as on the epistemology of anticipation.

https://www.ehu.eus/eu/web/miguelsanchezmazaskatedra/praxis/people/members/ibarra

Prof. Hannot Rodríguez
Department of Philosophy, University of the Basque Country, UPV/EHU, Spain

Hannot Rodríguez. BA in Philosophy, MA in Philosophy and History of Science and Technology, and PhD in Philosophy (2007) from the University of the Basque Country UPV/EHU. Associate Professor at the Department of Philosophy of the UPV/EHU. He is also a member of the Sánchez-Mazas Chair (UPV/EHU), and an affiliate of the Consortium for Science, Policy and Outcomes (CSPO) at Arizona State University. Research interests: risk governance of emerging technologies, public trust, socio-technical integration, responsible innovation, anticipatory governance, and "Open Science".

http://www.ehu.es/es/web/miguelsanchezmazaskatedra/praxis/people/members/rodriguez

Dr. Andreas Lösch
Institute for Technology Assessment and Systems Analysis (ITAS) at Karlsruher Institute of Technology (KIT), Germany

Andreas Lösch (PhD and habilitation) is sociologist, senior researcher and head of the research group "socio-technical futures and policies" and of the focus group on "vision assessment" at the Institute for Technology Assessment and Systems Analysis (ITAS) at the Karlsruhe Institute of Technology (KIT). In addition, he is private lecturer and teaches at the faculty for humanities and social sciences of KIT.

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Clemens Ackerl, KIT-ITAS, Karlsruhe, Germany, clemens.ackerl@kit.edu

Nex Bengson, Leibniz Universität Hannover, Germany, nex.bengson@gmail.com

Prof. Stefan Boeschen, RWTH Aachen, c:o/re and HumTec, Germany, stefan.boeschen@humtec.rwth-aachen.de

Max Braun, Universität Hamburg, Germany, max.braun@uni-hamburg.de

Prof. Dr. Guido Caniglia, KLI – Konrad Lorenz Institute for Evolution and Cognition Research, Austria, guido.caniglia@kli.ac.at

Leman Celik, Ruhr-University Bochum, Leman.Celik@ruhr-uni-bochum.de

Nina Maria Frölich, KIT-ITAS, Karlsruhe, Germany, nina.froelich@kit.edu

Prof. Andoni Ibarra, Universidad del País Vasco/Euskal Herriko Unibertsitatea, Spain, andoni.ibarra@ehu.es

Oihana Iglesias-Carrillo, Universidad del País Vasco/Euskal Herriko Unibertsitatea, Spain, oihana.iglesias@ehu.eus

Stefan John, RWTH Aachen University, Germany, stefan.john@humtec.rwth-aachen.de

Manuel Jung, Technical University of Munich (TUM), Germany, manuel.jung@tum.de

Dr. Bettina-Johanna Krings, KIT-ITAS, Karlsruhe, Germany, bettina-johanna.krings@kit.edu

Pablo Lima, University of Seville, Spain, plima@us.es

Dr. Andreas Lösch, KIT-ITAS, Karlsruhe, andreas.loesch@kit.edu

Prof. Dr. em. Helen Longino, Department of Philosophy, Stanford University, USA, hlongino@stanford.edu

Blanca Luque Linero, University of Lisbon, Portugal, pandelirios@hotmail.com

Carmen Margiotta, Lunds Universitet, Sweden, carmen.margiotta@LUCSUS.lu.se

David Álvaro Martínez González, Universidad del País Vasco/Euskal Herriko Unibertsitatea, davidalvaro.martinez@ehu.eus

Prof. Dr. Clark Miller, Arizona State University, USA, Clark.Miller@asu.edu

Carolin Moser, KIT-ITAS, Karlsruhe, Germany, carolin.moser@kit.edu

Max Priebe, Radboud Universiteit, The Netherlands, max.priebe@isi.fraunhofer.de

Prof. Dr. Harald Rohracher, Linköping University, Sweden, harald.rohracher@liu.se

Prof. Hannot Rodríguez, Universidad del País Vasco/Euskal Herriko Unibertsitatea, hannot.rodriguez@ehu.es

Sahana Subramanian, Lund University Centre For Sustainability Studies (LUCSUS), Sweden, sahana.subramanian@LUCSUS.lu.se

Markus Szaguhn, KIT-ITAS, Karlsruhe, Germany, markus.szaguhn@kit.edu

Giulia Volpini, INRAE Institute, France, giulia.volpini@inrae.fr

Niklas Wagner, University of Bonn, Germany, wagner@uni-bonn.de

Paul Moritz Wegener, Weihenstephan-Triesdorf University of Applied Sciences, Germany, paul.wegener@hswt.de

Helena Winiger, ETH Zürich, Switzerland, helena.winiger@usys.ethz.ch

Contact

Dr. Bettina-Johanna Krings

Institute for Technology Assessment and
Systems Analysis (ITAS)

Karlstraße 11
76133 Karlsruhe

E-mail: bettina-johanna.krings@kit.edu
www.itas.kit.edu

Edited by

Karlsruhe Institute of Technology (KIT)

Karlsruhe, Germany

www.kit.edu