



# Missions for sustainability

New approaches for  
science and society

5 – 6 May 2022  
Conference  
Summary Report

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## Background

Systemic innovations are urgently needed to address global sustainability challenges such as the climate crisis. The approach of mission-oriented research and innovation (R&I) promises to address this need: It aims to achieve ambitious and inspiring societal goals through a broad portfolio of inter- and transdisciplinary activities within a given time and resource frame.

Nevertheless, the design and implementation of mission-oriented R&I also raises new questions. In particular with regard to their normativity, possible conflicting goals, appropriate forms of governance, the accountability of actors, and with a view to social learning, it remains to be clarified how "missions" can be designed in a sustainable way.

## Aim

This two-day international event organised by the Leibniz Research Network (LRN) "Knowledge for Sustainable Development" aimed at a critical reflection on the mission approach in the context of sustainability science and focused on the future use and design of the approach for a more effective social and ecological sustainability transformation across different fields of action (e.g. climate change, food security, mobility, health), as well as on its prerequisites within the science system.

## Event

The conference brought together diverse actors from academia, policy and civil society to critically discuss opportunities as well as challenges and limitations of mission-oriented R&I. While the first conference day focused on the concept and design of the mission approach, the second day dealt with its practical operationalization. The conference took place in a hybrid format, combining live lectures at the Leibniz Headquarters in Berlin with a variety of interactive online formats on selected topics and issues.

## LRN Knowledge for Sustainable Development

The Leibniz Research Network (LRN) "Knowledge for Sustainable Development" was founded in 2020 by five institutes of the Leibniz Association. They have joined forces to provide input to current debates in the sustainability sciences and to enhance the overall effectiveness and impact of the field. The activities of the network are developed by a steering group made up of leading academics from these five institutes in dialogue with diverse stakeholders in science, policy and practice.

Sustainability science is a comparatively young research field that emerged only at the beginning of this century. It focuses on complex problems in the development and mutual interactions between humans, nature and technology. This requires the linking of diverse disciplinary approaches, as well as the direct involvement of societal actors into the research process. In

In addition, ethical standards of justice and different perspectives on space and time play a central role.

Despite substantive progress made in recent decades, sustainability sciences still require further theoretical and methodological development and a continuous reflection regarding dynamically changing problems. The targeted development of knowledge and its effective practical application requires new inter- and transdisciplinary approaches. The LRN "Knowledge for Sustainable Development" aims to fill an important gap here. In particular, the diversity of Leibniz institutes holds a great potential for synergies that need to be recognised, developed and used. But also the exchange with researchers in other national and international networks in the sustainability sciences is pursued to share experiences and identify key problems and solutions.

## Conference Topics

Six core topics guided the discussion:

- **Sustainability:** The mission approach claims to put innovation activity and growth to the service of the SDGs and a transformation towards sustainability. However, established R&I institutions and approaches often still pursue economic growth and technical optimization as principal goals. How can sustainable mission objectives be achieved within the existing R&I settings? What contradictions and challenges arise, and how can they be overcome?
- **Trade-offs:** Formulating missions and prioritizing societal goals implies to confront goal conflicts that are partly hard or even impossible to resolve. How can the mission approach account for the need to find acceptable trade-offs without compromising its own conception? What procedural designs would allow to identify, assess and cope with trade-offs both ex-ante as well as during mission implementation?
- **Scientific freedom:** Missions imply to steer scientific activity based on ethical choices (sustainability) and political legitimacy (participation), both of which necessarily constrains the freedom of science to define its own questions and priorities. To what extent can societal relevance form a condition for (publicly financed) research, and how can this be assessed? What balance and relations should be established between research aligned through missions and other research?
- **Governance:** Missions demand a new extent and quality of coordination across multiple institutional boundaries e.g. between policy domains (including esp. R&I), administrative levels, territories and sectors (public, private, civil), resulting in novel intermediary designs. In addition they also require inclusive stakeholder participation at different stages. What governance approaches are needed to deal with the related challenges (e.g. leadership, authority, legitimacy) while ensuring meaningful involvement and effective implementation?

**Subsidiarity:** The mission approach builds on diversity in a large and heterogeneous research landscape to achieve its goals. What role should be played by local or regional R&I approaches, since they are comparatively limited in terms of diversity while in turn featuring dense governance and collaboration structures (institutional thickness) as well as qualities of place? What are the respective potentials and limits at the local to European level, and how can missions at different levels become coupled effectively?

**Responsibility:** Missions involve science and scientists directly in the conception and design of transformative policies, measures and technologies, as well as their experimental implementation and evaluation. How can these new formats of science-policy coordination resolve questions of responsibility, accountability and legitimacy regarding the role of science? What framework conditions (e.g. error culture) and procedures would be required particularly with a view to the complexity of problems and uncertainty of solutions?

- **Social learning:** Missions require continuous reflexivity in order to quickly assess results and trigger research adjustments, policy learning as well as broader social learning processes. What approaches, methods and criteria are needed for monitoring and assessing missions and their progress? How could missions become embedded within existing structures and processes of policy- and social learning?
- **Complexity:** Missions can differ significantly depending on the nature, scope, scale, and urgency of the challenges they focus on. How can the approach account for these different degrees of complexity? What adaptations are required esp. in terms of governance and timing?



*Panel discussion „Sustainability and path-dependency of mission-oriented R&I“, Prof. Uwe Cantner, Dr. Lea Fünfschilling, Dr. Dietrich Nelle, Prof. Marc Wolfram (from right to left)*



# Programme International Conference 2022

Headquarters of the Leibniz Association, Berlin + Online

Thursday, 5 May 2022

13:00 CEST

## Opening

Prof. Dr. Marc Wolfram, Leibniz Institute of Ecological Urban and Regional Development (IOER)

13:30 CEST

## Keynote

### Innovation and Sustainability – friends or foes?

Dr. Lea Fünfschilling, Centre for Innovation Research (CIRCLE), Lund University

14:30 CEST

## Break

15:00 CEST

## Parallel Sessions

### Session 1: Mission-oriented Research in Agriculture and the Bioeconomy

Chair(s): Prof. Alfons Balmann, Leibniz Institute of Agricultural Development in Transition Economies (IAMO)

Prof. Barbara Sturm, Leibniz Institute for Agricultural Engineering and Bioeconomy (ATB)

### Session 2: The Old Man\* and the Sea: Ocean missions between conquest and saving the ocean

Chair(s): Prof. Achim Schlüter, Leibniz-Centre for Tropical Marine Research (ZMT)

Dr. Jan Stefan Fritz, German Marine Research Consortium

### Session 3: Rethinking research excellence in an era of sustainability transformation

Chair(s): Prof. Rainer Walz, Fraunhofer Institute for Systems and Innovation Research, ISI

Jürgen Kopfmüller, Karlsruhe Institute for Technology

### Session 4: Education and Learning in the Context of Sustainability

Chair(s): Prof. Willi Xylander, Senckenberg Museum Görlitz (Leibniz Research Museum)

Dr. phil. habil. Marion Fleige, German Institute for Adult Education (DIE)

**Session 5: Hydrogen economy: mission-oriented perspectives on goals and activities**

Chair(s): Dr. Christoph Wulf, Leibniz Institute for Catalysis

**Session 6: Mission-oriented R&I: Trade-offs and Implications for Governance** ( *canceled*)

**16:30 CEST**     **Break**

**17:00 CEST**     **Panel**

**Sustainability and path-dependency of mission-oriented R&I**

Dr. Lea Fünfschilling, CIRCLE, Lund University

Prof. Dr. Rainer Walz, Fraunhofer Institute for Systems and Innovation Research ISI

Prof. Dr. Uwe Cantner, Chairman Commission of Experts: Research and Innovation

Dr. Dietrich Nelle, Federal Ministry of Education and Research, Strategies and Policy Issues

**Friday, 6 May 2022**

**9:00 CEST**     **Keynote**

**Challenges and opportunities of mission-oriented policies to achieve Net Zero**

Dr. Philippe Larrue, Directorate for Science Technology and Innovation (DSTI), OECD

**10:00 CEST**     **Break**

**10:30 CEST**     **Parallel Sessions**

**Session 7: Achieving Climate Neutral Cities by 2030: Mission Impossible?**

Chair(s): Dr. Markus Egermann, Leibniz Institute of Ecological Urban and Regional Development (IOER)

**Session 8: Grassroots-Initiatives: Bottom-Up Sustainability Activities at German Research Organisations**

Chair(s): Dr. Jakob Schweizer, Max Planck Institute for Dynamics of complex technical systems Magdeburg, Max Planck Sustainability Network

**Session 9: How can criteria for socially responsible research facilitate mission-oriented research?**



Chair(s): Prof. Rainer Danielzyk, Academy for Territorial Development in the Leibniz Association (ARL)

Prof. Katharina Helming, Leibniz Centre for Agricultural Landscape Research (ZALF)

Prof. Achim Schlüter, Leibniz-Centre for Tropical Marine Research (ZMT)

### **Session 10: Missions for Sustainability from a Historical Perspective**

Chair(s): Prof. Dr. Matthias Hardt, Leibniz-Institut für Geschichte und Kultur des östlichen Europa (GWZO) Leipzig

Jun.-Prof. Dr. Tina Asmussen, Deutsches Bergbau-Museum, Bochum / Ruhr-Universität Bochum

### **Session 11: Mission-orientation in local economic development**

Chair(s): Dr. Judith Terstriep, Institute for Work and Technology (IAT), Westfälische Hochschule

Oliver Peters, German Institute of Urban Affairs (Difu)

Sandra Wagner-Endres, German Institute of Urban Affairs (Difu)

Maria Rabadjieva, Institute for Work and Technology (IAT), Westfälische Hochschule

### **Session 12: Engaging everyone in the SDGs: citizen science and participatory approaches**

Chair(s): Claire Murray, European Citizen Science Association

**12:00 CEST**    **Lunch**

**13:00 CEST**    **Panel**  
**Complexity and multi-level implementations of mission-oriented R&I**  
 Dr. Philippe Larrue, OECD  
 Dr. Neville Reeve, Missions, EU Commission  
 Roman Mendle, ICLEI Europe, Coordinator for Smart Cities, Circular Economy and Climate Neutrality

**14:00 CEST**    **Closure**

## Keynotes

### Keynote 1: Innovation and Sustainability – friends or foes?

Dr. Lea Fünfschilling, Centre for Innovation Research (CIRCLE), Lund University

#### 1) The role of deep-structural, socio-technical change for sustainability transitions

- Basic assumption: Sustainability requires changes of production and consumption practices. These changes have to be systemic, socio-technical and deep-structural (not incremental).

#### 2) The role of innovation for deep-structural, socio-technical change for sustainability transitions

- Sustainability transitions have become innovation's heyday.
- The link between innovation and change comes through the notion of creative destruction. Innovation as such is powerful enough to break with whatever existing stability we have and that can lead to something new. Therefore, innovation can trigger transitions.
- Most theoretical frameworks in transition studies have a strong innovation focus (MLP (multi-level perspective) SNM (Strategic niche method, TIS (technical innovation systems, etc.). However, innovations usually prove insufficient for replacing established socio-technical systems due to:
  - 1) Path-dependency: Incremental innovation is the rule. Radical innovation is very rare (Dosi 1982, Nelson & Winter 1977).
  - 2) Co-evolution and regimes: Socio-technical systems often remain stable (Geels 2004, Fuenfschilling & Truffer 2014).
  - 3) Decoupling and symbolic changes: A lot of the things humans do to trigger change are symbolic in nature, but don't actually lead to change (Meyer & Rowan 1977).
  - 4) Deep transitions and multi-level effects: Very often whether or not change is happening depends on what level we are looking at. Innovations may be radical at one level, but may strengthen persisting norms at a different level (e.g. globally) (Schot & Kanger 2018, Feola 2020).

#### 3) The role of innovation for sustainability and implications for policy

- Innovation bias is based on the notion of creative destruction.
- There is a conflation of innovation and change, which is quite problematic. This becomes especially visible in governance questions, e.g. concerning transformative innovation policy and mission-oriented innovation policy. When talking about how to govern sustainability transitions, this is often rooted in innovation policy. Therefore, there is a clear correlation between new governance methods and innovation.

- What is the role of innovation for system change? It could be argued that we have generated a lot of innovations necessary for sustainability, but they don't diffuse.
- What are the limitations of innovation policy in responding to societal challenges? We lose a lot of the crucial policy areas, e.g. in countries like Sweden, where sustainability governance is based on the work of innovation agencies, which often support existing institutions instead of creating actual change.
- For new things to emerge and institutionalise, other components of the system need to disappear. Existing systems need to be dismantled.

## Keynote 2: Challenges and opportunities of mission-oriented policies to achieve Net Zero

Dr. Philippe Larrue, Directorate for Science Technology and Innovation (DSTI), OECD

### 1) What are mission-oriented policies?

- The OECD understands missions as a co-ordinated package of initiatives (policy, regulatory, platforms, etc.) tailored specifically to mobilise science, technology and innovation in order to address a societal challenge.
- This co-ordinated package is aimed towards ambitious and concrete goals to be met in a defined time-frame, spans several stages of the innovation cycle from research to demonstration and market launch, crosses various siloes (disciplines, sectors, policy areas, etc.) and uses various instruments (supply-side and demand-side; top-down and bottom-up).
- There are three main dimensions of missions: (1) strategic orientation (objectives, mission statements and strategic agendas) (2) policy coordination (how to align the plans of actors) and (3) policy implementation (policy package, funding instruments)
- These dimensions are not new, but mission-oriented R&I integrates these dimensions into one package. A mission-oriented R&I needs to enable collective action by co-creation of the mission (derived roadmaps, strategic innovation agendas), setting a dedicated structure of governance and leadership (e.g. interdepartmental coordination group, dedicated mission manager etc.) and implementing an intended tailor-made policy mix (using various instruments and funding streams).
- In reality, you find different types of mission-oriented innovation policies: (1) overarching mission-oriented strategic frameworks e.g. Horizon Europe's missions (EU), mission-driven Top Sectors (NL), Hightech Strategy 2025 (DE), (2) challenge-based programmes and schemes e.g. Pilot-E (NO), The Future Innovator Prizes (IE), (3) thematic mission-oriented programmes e.g. Mobility of the Future (AT), CLIMIT (NO), and (4) ecosystem-based mission programmes e.g. vision-driven innovation milieus (SE) and growth engines (FI).

## 2) Challenges of Mission-oriented Innovation Policies (MOIP)

### Strategic orientation:

- Most MOIP pick problems, not solutions and they remain limited to scientific/technological solutions. In order for missions to be transformative we need a much broader scope including social innovation and the behavioural and societal dimension.
- Additionally, many initiatives lack a set 'real' missions (bold, targeted, measurable, time-bound etc.). There is significant mission washing or mission dilution.
- Missions must be consistent with the resources and capacity of the country/ region/ city.
- There is often a sequential process of mission definition, with gradual narrowing down of directions. Targets are specified by the actors bottom-up during the call for proposal. However, these processes are often not challenge-led.

### Policy coordination:

- Elaborated multi-level ('nested') governance structure generates important transaction cost and coordination fatigue.
- Mission-oriented policies are still driven by public bodies in charge of STI policies (e.g. innovation agencies), sectoral ministries remain on the passenger seat.
- Missions must be fed with investigator-led research and key enabling technologies which are by nature (and must remain) non mission-oriented.

### Policy implementation:

- Portfolio management requires additional resources and different practices, selection and evaluation criteria, mind-sets.
- MOIPs still rely on traditional (non-systemic) evaluation tools and methods – limited lessons learned. These 'instruments packages' are still not well integrated.

Conclusion: As the R&I approach is still in its infancy, the environment is changing very quickly. MOIPs are deeply embedded in national institutional settings. Countries are continuously learning about/ from MOIPs, as they implement them.

## 3) Discussion

- Change is often happening within implemented instruments and approaches, but organisational models remain the same. Some organisations e.g. in Finland and Norway are working on these challenges.
- Missions set problems, not solutions. Therefore, initiatives need to leave some room for 'mechanisms of surprise'/ uncertainties.
- Missions could be thought as a fabric, combining different types of R&I approaches as a requisite for achieving systemic change.

- EU member states that lack innovation policies so far are supported under the DG REFORM of the EU Commission to strengthen their transformation abilities. These countries rely on structural funds from the EU, so their innovation agenda is led by the smart specialization strategies, which have evolved and started to apply sustainability/ecosystem-based approaches.
- Non-technology core solutions should be implemented into missions in the governance structure e.g. involving them in the definition of the agenda and the stakeholders
- There is not enough effort (work and money) put into ex-ante assessments of missions yet. This is, however, increasingly part of the agenda.



Keynote speaker Dr. Lea Fünfschilling (Lund University) on “Innovation and Sustainability – friends or foes?”



Keynote speaker Dr. Philip Larrue (OECD) on “Challenges and opportunities of mission-oriented policies to achieve Net Zero”



## Parallel Sessions

### Session 1: Mission-oriented Research in Agriculture and the Bioeconomy

Session organiser(s):

**Prof. Dr. Barbara Sturm**, Scientific Director, Leibniz Institute for Agricultural Engineering and Bioeconomy (ATB)

**Prof. Dr. Annette Prochnow**, Deputy Scientific Director, ATB

**Prof. Dr. Alfons Balmann**, Scientific Director, Leibniz Institute of Agricultural Development in Transition Economies (IAMO)

Session Description:

The agri-food sector and the bioeconomy are key to meet many of the UN Sustainable Development Goals (SDGs). However, due to the specifics of agricultural production, the extreme heterogeneity of production conditions globally as well as on regional scales, and the many trade-offs between the SDGs, potential technological and institutional solutions are intensely debated within society, politics and science. In such a context, mission-oriented research faces particular challenges.

Against this background, the session organisers aimed to bring together researchers from natural and engineering sciences who work towards solutions to address the societal challenges with social scientists and ethicists who address issues such as why good intentions may fail due to means-end confusions in societal discourses or due to naturalistic and moralistic fallacies.

The Leibniz Innovation Farm for Sustainable Bioeconomy served as a showcase for a mission-oriented development of innovative concepts for a sustainable, circular bioeconomy by combining crop and animal production with a research biorefinery. The research infrastructure is currently implemented by ATB and numerous partners from Leibniz Association and is funded by public money. Already during its implementation process, topics such as digitization, agroecology, adaptation to climate change, and farmers as entrepreneurs arise in discussions with the different stakeholders, among them farmers, representatives of administration and industry, as well as scientists.

In a brief introductory presentation, the audience learned about the case study project 1 and its goals more in detail.

Seeing that intense work is going on globally – in research, in economy – trying to provide innovative solutions to address the societal challenges such as climate change, biodiversity loss etc., such work seems to be quite often driven by a merely technological perspective, thus entailing the risk of counter-effects such as process/technology-related rebound effects as well as social and psychologic effects. In order to formulate consistent goals for our envisioned long-term agricultural structures in Germany (and elsewhere as well) the essential socio-economic processes, such as path dependencies must not be neglected.

The following impulse contributions from the social sciences highlighted the need for critical reflection of missions to avoid a confusion of means and ends and moreover to differentiate

between normative premises and empirical facts when drawing conclusions. Providing healthy food and bio-based materials, adapting to climate change and maintaining biodiversity are some of the central goals of the realization of a resilient and sustainable bioeconomy. The Innovation Farm – the case study in this session – can clearly be seen as a mission-driven endeavour. Mission-driven calls from funding agencies on all geographic scales including EU are increasingly being issued, for example 'Protection/Re-wetting of peatlands' or the Horizon Europe Soil Deal mission of which some knowledge gaps were highlighted in the final contribution before the general discussion. This following interdisciplinary exchange between the four contributors from their different disciplines as well as with the online audience discussed the complex trade-offs in agriculture & bioeconomy as well as previous failures in innovation implementation.

Main discussion points and reflections:

For the case study Innovation Farm, its mission-oriented goals have been so far identified starting at a broader scale (for example SDGs), but take nevertheless a strong regional perspective, for instance with regard to sustainability. It might be helpful to start a participatory process with different stakeholders to check the goals and define a target system that in the future enables to reflect and monitor on the demonstrated innovations. It might as well be appropriate to check the concept of regional sustainability in order to avoid creation of blind spots elsewhere.

An often heavily debated trade-off with regard to agriculture is that of securing food production versus environmental effects of agricultural activities, which was mentioned during this session as well.

Taking on a so-called ordonomic perspective, science could be seen as a social process where an Overton window provides the option to ask a wide range of questions (representing dissent) and the scientific process itself provides rules for methods and critical discourse which finally results over time in an output of knowledge on which consent exists.

Mission-oriented science may remain still supportive in terms of finding such consent if (a) the mission-orientation does not shrink the spectrum of questions possible to ask in the beginning and (b) the scientific discourse increases the convergence of expertise at the output (procedural integrity). Moral absolutism, in defining questions as well as in expected answers, poses a threat, not only in society but also within academic discourse.

So checking these two criteria might assist the decision if mission-oriented research in each specific case is helpful or hindering the scientific process of generating knowledge.

An open functional discourse is needed which includes expert knowledge from numerous disciplines from

- philosophy, for instance to identify the kind of underlying moral problem,
- economics to help understanding underlying incentive structures,
- natural sciences to understand related risks, - psychology to understand underlying cognitive mental models (i.e., innovation opponents might be less outcome-oriented but instead firmly set in moral conventions).

- politics to understand conflict of interest issues which is basic to understand the problem that is being dealt with

Then it might be possible to reach a solid action-guiding judgement from research. Scientists should avoid either just following moral judgements (“Genetically Modified Organisms (GMO) should not be allowed in organic farming”) or mere empirical findings (“GMOs lead to efficiency gain in food production and hence should be used unconditionally”), but instead should take/maintain an open-minded position and hence allow for existing action-guiding judgements being changed. In order to do so, researchers should engage in counter-intuitive thinking because moral cognition boundaries might exist (moral framework might not have kept pace and lacks behind with recent technological innovations).

It needs to be emphasised that for solving specific problems, as for example soil-related natural science ones in agriculture, it is indispensable to gather and integrate expertise from numerous scientific disciplines and to better understand drivers of soil management and impacts of achieving the different objectives, for example trade-offs, spill-over, rebounds.

Trade-offs must always be assessed also in terms of time and space dimensions. Some missions (i.e., secure food security) might on the short-term be achieved by existing technologies even though long-term solutions (i.e., in-house food production) might not be fully developed and other missions such as avoiding soil degradation will co-profit on the long-term.

Transitions need changes in norms and mental models which might take generations. This time when implementing innovative solutions might be reduced by mission-oriented research provided that directions given by policies are correct and do not led us astray. I.e., science needs to provide relevant information to politicians and check the mission orientation for the criteria mentioned above

Main results and conclusions:

Analysis and/or assessments of mission-oriented R&I:

- Mission-oriented research may foster the development of scientific solutions if it is sufficiently open to new ideas which are allowed to compete in a process based on scientific arguments.

Recommendations for future mission-oriented R&I:

- We need a broad range of involved disciplines in mission-oriented research (incl. political sciences).
- Mission-oriented research should avoid moralistic and naturalistic fallacies which mean that an *Ought* is derived from an *Is* or an *Is* is derived from an *Ought*.
- Who defines scientific missions? Scientific missions should link knowledge about societal challenges with scientific potentials.

Open questions and unsolved issues:

- Research questions in agriculture and bioeconomy can and should be solved involving inter- and transdisciplinary approaches and remain open-minded. The case study of this

session (Leibniz Innovation Farm) offers the opportunity for taking different perspectives and can act as a starting point to bring different disciplines together and to collaborate.

## Session 2: The Old Man\* and the Sea: Ocean missions between conquest and saving the oceans

Session organiser(s):

**Prof. Dr. Achim Schlüter**, Chair, Social Sciences Department, Leibniz Centre for Tropical Marine Research (ZMT)

**Dr. Jan Stefan Fritz**, Managing director, German Marine Research Consortium

Session discussants:

**Claire Jolly**, Head of Unit STI Ocean Economy Group, Directorate for Science, Technology and Industry, Organisation for Economic Co-operation and Development (OECD)

**Björn Stockhausen**, Fisheries and Ocean Advisor, The Greens/EFA Parliamentary Group, European Parliament

**Prof. Kimberley Peters**, Professor of Marine Governance, Helmholtz Institute for Functional Marine Biodiversity at the University of Oldenburg

**Prof. Raimund Bleischwitz**, Scientific Director of ZMT

Session description:

This session applies economic and social science perspectives to examine human-nature interactions and relations, with a focus on how scientific ocean missions in practice, straddle the spectrum of conquest and ocean protection. The session consists of four presentations. The questions raised in this session include:

1. What direction is the blue economy taking and what is the role of the public sector in steering this direction? How can mission approaches to the blue economy be characterised
2. Are they business-as-usual in terms of conquest of space or do they offer genuinely novel ways of addressing societal needs while addressing the protection and sustainable utilization of ocean resources?
3. Have ocean economy narratives changed or are they essentially the same narratives couched in different terms? How do narratives shape our interactions and relations with oceans? What are the key trends in the intensification of ocean use and ocean protection?
4. How do ocean missions fit into the choice of economic instruments for shaping the ocean economy?
5. What are the key challenges to achieving a balance in the use and protection of marine species, particularly in relation to Green politics?

Through these interrelated topics, the session creates space for collective discussion and reflection on the current status of ocean missions and how they can be further developed to

address sustainability challenges through partnership of science and society. The topics will be addressed in four presentations of about 5-10 minutes each. A discussion between the presenters and the audience will be facilitated following the presentations.

Main discussion points and reflections:

- Are ocean missions business-as-usual or are they a new approach? This remains an open question.
- Missions are most effective when they are localised, sector-specific, and avoid duplication of efforts. Missions can be counterproductive if they are too directive from the top.
- Governments are funders of science, performers of science, policy-setters, and regulators. They play an important role and will continue too. At the same time, funding from philanthropy is also increasing.
- History, legacy, power, and reflexivity are important in ocean missions. History helps us understand how modes of governing and tools of governance came to be. Understanding the past helps make sense of current conditions and predict the future. But there is historical blindness in some governance work. In discussing the science we need for the ocean we want, we need to ask wanted by who? Whose science? Whose oceans?
- Blue economy has the potential to contribute to addressing climate change but it requires deep transition. A public purpose needs to be defined that is centred around environmental sustainability. Blue carbon management requires systems thinking. Risks of greenwashing and expropriation must be avoided. Blue economy as interconnection in a fragmented world. It could be a twin to the green recovery and green deal.

Need funding support and to establish a stronger science and a stronger capacity for ocean missions. In many cases, there is a lack among national governments to provide needed data and this needs to be addressed.

Main results and conclusions:

Analysis and/or assessments of mission-oriented R&I:

- Ocean missions in the contemporary senses are relatively new and assessments are too early to be made. But it depends on the angle one looks at. If in relation to funding, there has been an increase in the funding for ocean missions, but this remains low relative to funding for other sectors. There is substantial funding from developed countries but many of these are also driven by economic interests. Funding from private sources such as donations are channelled to education and training, but it might be ad hoc.

Recommendations for future mission-oriented R&I:

- It is important that mission-oriented R&I pay attention to histories of ocean governance and ocean utilization which provide the basis of the legacy we experience today. Understanding the past such as oceanic exploration helps see power relations. It is important to pay attention to power and geopolitics in strategizing and funding and to be alert in the way that power is used.
- Consider doughnut economy as a framework for balancing different interests such as environmental sustainability and societal needs

Open questions and unsolved issues:

- Policy needs science and science needs to be strong. Yet, in an environment where many people do not listen to science, it is possible that science communicates facts clearly and still generate resistance. How can this be addressed?
- There is a need for inclusiveness in views, priorities, and design of mission. Co-design mechanisms are needed. How do we make sure that different voices are heard?
- How to be realistic about the role of lobbyists who are paid to work for specific interests that may be in contrast with sustainability and social justice principles?

## Session 3: Rethinking research excellence in an era of sustainability transformation

Session organiser(s):

**Prof. Dr. Rainer Walz**, Fraunhofer-ISI, Deputy of the Institute, Head of the Competence Centre Sustainability and Infrastructure Systems  
[rainer.walz@isi.fraunhofer.de](mailto:rainer.walz@isi.fraunhofer.de)

**Jürgen Kopfmüller**, KIT-ITAS, Head of cross-cutting area sustainability  
[juergen.kopfmueeller@kit.edu](mailto:juergen.kopfmueeller@kit.edu)

Session description:

Societal transformations towards sustainability require suitable knowledge. This requires research to consider societal responsibility more systematically, and to direct it, accordingly, towards a high solution-orientation and impact. Currently two main issues are debated: Firstly, how can this responsibility be understood, operationalised and implemented. Secondly, how should research quality and excellence criteria, particularly in funding and evaluation processes, be modified. Debates also circle around possible conflicts that emerge between research carried out in stronger orientation towards more societal responsiveness, and other existing scientific models, above all stressing freedom of research, efficiency and efficacy.

The session dealt, firstly, with approaches to enhance research quality and excellence criteria, as well as the relevance, definition and measurement of impact as quality criterion. Based on preliminary results from the LENA-Shape/LeNa Value project, it focused on current definitions of excellent research and debates about needs to revise them. Different system boundaries (e. g. disciplines), for which new definitions of excellence should apply, were addressed, as well as the renewed shape of dealing with impact considerations within a revised excellence framework. Secondly, ethical foundations of science, research and knowledge were addressed by discussing the relation between research responsibility and freedom of research. The key argument was that the normative and, e. g. in Germany, constitutionally guaranteed principle of freedom of research cannot be separated from responsibility in and of research. Even more, that reflecting on and practicing societal responsibility – including reflecting on and balancing conflicts of values and norms – is an act of implementing excellence in research in an enhanced understanding. Thirdly, it was discussed in how far the German FONA (Research for Sustainability) programme can be understood and serve as a role model for a reviewed concept of



excellent research. Based on results of a recent evaluation carried out by Fraunhofer ISI, the programme performance with respect to traditional measures of excellence was presented, but also achievements and barriers towards new forms to design and implement research processes in a more societally responsible way. Furthermore, limitations of measuring societal impacts and the need for new concepts in this field were discussed.

Format: three presentations and discussions on each

Main discussion points and reflections:

- Which (potentially changing) role do issues of normativity play in funding calls, re-search processes and evaluation procedures if societal responsibility is considered in a more systematic way, and how can this be dealt with appropriately? Being possibly transparent regarding values, understandings, definition, assumptions within research processes is one answer to this. This means that normativity and ethical reflection may not be seen as being somewhat external to research but rather inherent part of it
- What role could mission-oriented innovation science policy play here?  
Mission-orientation clearly rests on normative decisions and these have to be made explicit (transparency, see above). This also implies the need to ethically reflect on i) the role of science within democratic institutions and political power constellations, ii) the way science itself is being done: inter- and transdisciplinarity, participation, non-scientific knowledge, etc.
- A mission-oriented science and research also requires to measure how far it contributes to the achievement of the mission. This poses additional challenges for the definition, measurement and assessment of research impact: it is not only necessary to monitor output of research in commonly used scientific and academic terms, but also the impact with respect to the mission, which, however, often occurs within an additional time lag, requiring according evaluation procedures, resources and competencies of involved actors.

Main results and conclusions:

- In order to support societal transformations towards sustainability in an appropriate way, research processes, the definition and measurement of research quality/excellence and research impact, as well as science system framework conditions (e. g. funding and evaluation guidelines) have to be modified to consider societal responsibility more suitably and systematically.
- Societally responsible research is not a contradiction to freedom of research, but is part of the practice and implementation of freedom. Ethical reflections on the foundations, goals, methods and consequences of research are a core element of scientific excellence, for which sufficient funding and time resources should be provided.
- The German FONA (Research for Sustainability) programme can be seen as an example of both, a modified defined excellent research and existing barriers to design and implement research processes more responsibly and to measure societal impacts beyond common bibliometric and scientometric methods. Thus, more money for funding of

programmes such as FONA is not enough; additionally, institutional and structural changes (funding guidelines, evaluation procedures, etc.) and a modified model of excellence have to be institutionally established and practically implemented.

Open questions:

- How can enhanced criteria for research quality/excellence be defined suitably in detail that are both thematically relevant and practicable in analytical and resource requirement respects?
- How far can general criteria be developed for all disciplines and how far is a specification for specific disciplines and/or thematic fields necessary?
- How can often occurring time-lags of research impacts be addressed suitably – methodologically, research organisationally and with respect to resource requirements?
- How can research processes be organised (and accordingly funded) to better provide the space, fora and resources needed for research that better meets key responsibility criteria?
- How can the processes and methods of monitoring research outcomes be developed further appropriately, in order to support an ex-ante impact assessment of research on mission achievements which better enables both researchers to reflect about their concrete intentions and decision makers to adjust their expectations on research results?

## Session 4: Education and Learning in the context of Sustainability

Session organiser(s):

**Dr. phil. habil. Marion Fleige**, German Institute for Adult Education Leibniz Centre for Lifelong Learning

**Prof. Dr. Willi Xylander**, Senckenberg Museum Görlitz (Leibniz Research Museum)

*Authors of contents of this abstract:* Dr. phil. habil. Marion Fleige (DIE), Dr. Bettina Thöne-Geyer (DIE), Prof. Dr. Willi Xylander (Senckenberg)

Session description:

The session focused on the foundations of sustainability and reflected the aspects of learning and education as potential approaches for transfer in view to sustainability.

The session was composed of three presentations and a subsequent discussion. Thereby, the session drew on exemplary practice and research from educational and research institutions as well as from cultural institutions with associated educational mandates within the Leibniz association and its networks.

The first presentation, given by Willi Xylander, Professor at the Technical University Dresden and Director of the Naturkunde Museum in Görlitz was titled: *Museums educational formats for sustainability. Insights from visitor and impact research* provided information on empirical results for sustainable learning opportunities in museums by addressing topics of nature and environment as well as nutrition and consumers behaviour (i.e. Xylander 2020a,b). Sustainabil-

ity items addressed in this context are for ex. biodiversity, loss of biodiversity but also monitoring activities by citizen scientists. Empirical research projects on visitor's awareness on sustainability in contexts with museum objects (like for ex. a meadow) shows, that the topic sustainability must be clearly addressed by the museum, to get attention on it. Thereby, innovative educational formats like virtual reality animation can raise the awareness and the understanding of visitors of sustainable contexts up to 80 percent. Citizen science projects, which provide valuable data for assessment of biodiversity loss and as such contribute to the awareness raising on sustainability, can be significantly improved by training workshops. Organised learning leads to an improvement of taxonomic skills as well as an increase of interest among the participants compared to non-participants.

The second presentation, held by Franziska Loreit (DIE), was titled: *Temporary Permanence (TemPe) – Innovative and flexible mediation of current relevant topics in permanent exhibitions*. It explained a research project focusing on the aim to develop a prototypical exhibition element to present current discourses and research results in permanent exhibitions by presenting a topic from three perspectives: society; art; and science. Theoretical considerations on pro-environmental behaviour within the context of museum visits bind together environmental knowledge and (visitor) experience and build up the theoretical background. Models to be used and operationalised for this kind of research were presented. Within the research project core questions to be discussed and empirically investigated are for ex. how far museum exhibitions can contribute to environmental knowledge, to environmental awareness, to environmental attitudes and to values as well as to environmentally aware behaviour / behavioural intentions. The discussion of the empirical results and theoretical models also lead to questions of methodology and scientific methods to investigate the effects of learning offerings on sustainable behaviour and changes on attitudes and values.

The third presentation – held by Marion Fleige – was titled: *Learning over the life span in the context of sustainability and its institutional, pedagogical support*. The presentation widened the view and focused on institutional, pedagogical and anthropological conditions for sustainability over the life span especially in adult learning institutions, backed by a) theoretical insights from (adult) educational theory and anthropology and b) program planning and institutions for the learning of adults and over the lifespan (i.e. Fleige et al. 2018; 2022i.E.). The presentation illustrated that learning over the life span is possible and takes place (from the beginning to late life), and it is beneficial for the participants and their social environment as participant research shows. Learning over the life span means expanding on knowledge and competencies and differentiating them. There is a wide range of benefits and of forms of processing knowledge gained in educational settings. Learning in adulthood, in particular, is crucially bound to personal learning interests that need to be stimulated. – Moreover, as the presentation by Willi Xylander already demonstrated, it may be particularly connected to esthetical experience as intrinsic drivers, and it is biographically relevant: especially in the areas of nature and environment.

The session took place in a hybrid format. The two session organisers who were presenters, too, were on-site in the office of the Leibniz association in Berlin, the third presenter as well as the audience participated online.

Main discussion points and reflections:

Sustainability-related learning and transfer to target groups can be realised either through missions and research data of the (educational and cultural) institutions or through educational theory and empirical knowledge about learning over the life span and its anthropological conditions.

Sustainability-related education and learning covers a wide range of target groups, of approaches (scientifically driven, institutionally framed, based on personal convictions and knowledge of pedagogues etc.); it includes a range of learning locations and didactical settings as well as degrees of formalization: formal, non-formal (both classroom-based and for instance in learning stations at museums) and informal learning opportunities and educational offerings; and contents. It shows to be beneficial and effective in many different ways, as both the research on the "Wider Benefits of Lifelong"- research (Manninen et al. 2014) imply and research from the Senckenberg museum in Görlitz so far shows.

Main results and conclusions:

Sustainability-related education and learning must be conceptualised as lifelong learning process (intergenerational) as well as life wide learning process (involving real contexts and authentic settings) – leaning back on adult educational theory and anthropology and backed by empirical results on adult education and learning as well as programming and didactics.

Sustainability-related education and learning needs educational offerings, mediation forms and formats as well as methods on a concrete level. This is carried out by educational and cultural institutions (with an associated educational mandate) etc. However, sustainability-related education and learning should be tied to greater educational programs and policy strategies (as in ESD). It needs international cooperation and global awareness.

Open questions for further discussion are:

- How do the results of sustainability-related learning affect the "missions" themselves?
- How could "social learning" (as a conference theme) be operationalised as a "Mission" and how does it relate to sustainability education? (In the first place, the "Mission" concept calls for 'social learning' in order to address learning processes of individuals and social groups so that change may become possible.)
- How does organisational learning contribute to sustainability (learning)?
- Which educational and social science questions can be connected here?

(To some of these issues, a planned presentation by *DVV International, Institut für Internationale Zusammenarbeit des Deutschen Volkshochschul-Verbandes e.V. (DVV)* might have provided first answers but was missing from the agenda due to illness. Topics as planned would have been: "Global Learning" – Participants experience the interconnections between everyday live and global interconnections" and "Live what we teach, teach what we live – How to align the whole educational institution according to sustainability criteria".)

## Session 5: Hydrogen economy; mission-oriented perspectives on goals and activities

Session organiser(s):

**Christoph Wulf**, Research Coordination Hydrogen Technologies, Leibniz-Institute for Catalysis Rostock (LIKAT)

Session description:

With the terrible war in Ukraine, energy dependence of parts of Europe has become abundantly clear. On the path to technological sovereignty, sustainable economic activity according to the European Green Deal and climate neutrality, hydrogen technology is of great importance. To achieve the ambitious goals, however, major and coordinated efforts are required from politics, science, industry and society. To this end, the Leibniz Association, under the leadership of Prof. Dr. Beller, Leibniz Institute for Catalysis, has pooled its expertise in the Hydrogen Economy Cluster. In the Hydrogen Economy session, we heard impulse contributions from Airbus on the Zero Emission Aircraft as well as from an Expert for Regulations of Energy Law and Hydrogen, among others. After this impulse lectures the attendees discussed several topics regarding technological as well as regulatory requirements for a hydrogen economy.

Main discussion points and reflections:

With the truly stimulating keynote presentations, the need for greater collaboration and networking was addressed. Due to the current very good funding opportunities with a wide variety of funding sources, there are presumably projects with the same focus. Therefore, redundancy in some main topics should be avoided through improved networking by letting the participants work together.

A constructive input was given by the speaker Dr.-Ing. Christian Rückert from Airbus. It would be helpful to have at least a Europe-wide comparison to avoid double funding or duplication of work. Internationally, Europe is lagging in some key areas.

Main results and conclusions:

In addition to the handling of intellectual properties and open access publication, the acceptance of hydrogen in the public must also be given greater consideration. To eliminate fears and misunderstandings, dissemination of the project results and demonstration on real exhibits should be achieved.

## Session 6: Mission-oriented R&I: Trade-offs and implications for Governance

*cancelled*

## Session 7: Achieving Climate Neutral Cities by 2030: Mission Impossible?

Session organiser(s):

**Dr. Markus Egermann**, Leibniz Institute of Ecological Urban and Regional Development (IOER)

**Marina Novikova**, Leibniz Institute of Ecological Urban and Regional Development (IOER)

Session description:

Achieving climate neutrality rapidly is one of the key missions of the 21st century to ensure a liveable planet. It requires fundamental changes within and across multiple action domains (energy, transport, food, etc.) and sectors (public, private, civil society). Cities play a key role in achieving climate neutrality due to both the accumulation and combination of mitigation challenges and the innovative potential and transformative power attributed to cities. In this session we focussed on the transformative capacities that cities need to transform multiple urban systems toward climate neutrality and will identify pathways to increase this capacities in different local, regional and national contexts. Especially we discuss the opportunities and challenges of both vertical and horizontal coordination of mission oriented policy and research.

The following overarching questions were discussed in two rounds:

How to integrate all policy domains (energy, transport, food, etc.) and all actors (public, private, civic) in the implementation of the Mission on Climate Neutral Cities?

How to coordinate actions for the implementation of the Mission on Climate Neutral Cities vertically (EU, National, Regional, Local)?

Main discussion points and reflections:

The session included two rounds of discussion focusing on both questions to the speakers and questions from the audience. The main points of both rounds are summarised below:

- Cities cannot solve the challenges alone, do it in a holistic approach, counting on the support of the local ecosystems with cities being at the core.
- Knowledge created should be available not only for selected cities within the Mission but for all other cities, too.
- Missions are more of tools rather than clear pathways, but it is still complicated for a city to make use of the tools provided by the European Commission.
- Cities have to be able to use the opportunity of participating in various Mission and the city administrations need the capacity to “translate” these politics in their local context.
- Missions experience a certain “jump” from local directly to the EU level (mainly bypassing regional and national governance levels) - this needs to change, with the interaction between the levels being strengthened and local levels needed for the implementation of the Mission.



- Stakeholders need to be acknowledging the resource scarcity - implementation of any idea is also limited and needs to take into account and be realistic about shortage of resources.
- There is a need not only for regulation but also for de-regulation.
- National/ regional governments have to take the leadership and be the intermediary in translating the information to the city level (in order to align the policies).

The cities quite often miss the capacity to dig through the information - cities need support in access to good information in a quick, efficient way.

Main results and conclusions:

Main outcomes of the discussion covered the domains of integrated policy-making of the Mission on Climate Neutral Cities as well as the coordination actions for the implementation of the Mission on Climate Neutral Cities vertically along the EU - national -regional -local axis. The main considerations and the outcomes are summarised below.

- The successful implementation of the Mission is possible only through counting on the cooperation between industry, academia, research centres, and financial institutions.
- The intention of the Mission is not imposing the rules and the procedures but on co-creation of a strategy to achieve climate neutrality (keyword: a clear strategy).
- The stakeholders from the city level expressed the need for such strategy to be more consistent with the activities.
- There is a strong need to maintain the action for almost a decade which requires a certain commitment that is not dependent on the change in administration
- The city administrations need sectoral partners with a clear commitment to the strategy over an extended period of time - at the moment that represents a challenge in need of a solution.
- Connected to the previous point, the city administrations also see a certain disconnect between strategic levels and the level of implementation that comes with the changes in political environment (e.g. the change of mayors).
- At the same time, the Mission strongly points out the peer-to-peer learning (e.g. among city administrations) that is of huge importance; the Online Platforms potentially allow for such exchange to take place.
- In order to facilitate said peer exchange, the twinning program pilots will be designed, providing the room for replication that goes beyond the online space.
- Mutual learning and knowledge sharing are seen as important elements. Learning formats the Mission Platform will provide are the before mentioned "City Panels" which include Mission Cities but as well other Cities from all over Europe. Further Cities will be clustered and linked to national and European Stakeholder groups. The City Clusters might at least be based on national clusters, with another important parameter being the climate "Readiness".

One of the open questions focuses on the challenge of aligning both worlds: The EC has made a considerable campaign of explaining the goal for 100 cities to be climate neutral by 2030; the cities are motivated to be a part of the Mission. How to translate this info to other cities in Europe?

## Session 8: Grassroots-Initiatives: Bottom-Up Sustainability Activities at German Research Organisations

Session organiser(s):

**Jakob Schweizer**, Scientific Coordinator at the Max Planck Institute for Dynamics of Complex Technical Systems

Session description:

The session was divided into a presentation part (first half) and a discussion part (second half). During the first half, four presenters (affiliated with the four largest non-university research organisations in Germany, the Leibniz association, the Helmholtz association, the Fraunhofer society and the Max-Planck Society) presented for about 7 minutes each, while the second half was reserved for a discussion among the presenters and the audience. The main topics of both were the titular Grassroots-initiatives in German research organisations: The Working Group Sustainability of the PhD and Postdoc Networks in the Leibniz Association, the Network Helmholtz Climate-Neutral, the Network Sustainability of the Fraunhofer Society, and the Max Planck Sustainability Network, which are all efforts to make science and research operations in the respective organisation more sustainable. These initiatives are bottom-up approaches formed by early researchers like Doctoral and Postdoctoral researchers or Students. The main motivation for these efforts is the fact that researchers across Germany tend to contribute to multiple environmentally problematic activities, such as frequently flying and contributing to traffic, producing problematic waste, and consuming large amounts of energy for electricity and heating/cooling, which usually comes from cheap, non-renewable resources.

It should be noted that this session was only marginally connected to the idea of mission-oriented research and development. While some challenges discussed in the session were related to the ones that mission-oriented R&D faces (such as scientific freedom remaining intact), the overall discussion revolved significantly more about specific targets and current challenges in meeting those targets and organizing the overall work.

For the first half of the session, the four presenters summarised the efforts in their respective organisations. Each presentation contained a few examples of achieved goals and current challenges, outlined which pillar of sustainable transformation is prioritised where and how, and explained how the measures with the biggest impact were identified and monitored. To give some examples: The Working Group Sustainability in the Leibniz Association raised awareness for the topic of sustainability and started implementing small, everyday measures to reduce problematic waste or the individual carbon footprint. The Network Helmholtz Climate-Neutral participated in the creation of guidelines of sustainable development in non-university research organisations, works on becoming a role model for sustainable development, and sets

specific carbon emission limits. The Network Sustainability of the Fraunhofer Society has implemented CR-reporting for the organisation and works on becoming climate-neutral by 2030. The Max Planck Sustainability Network places a specific emphasis on ecological sustainability in combination with keeping scientific freedom intact, including CO<sub>2</sub> compensation and the creation of more animal-friendly buildings, while also prioritizing the targets with the biggest impact first, just like the other organisations.

During the discussion that followed the presentations, specific topics were addressed in more detail, which will be summarised below.

Main discussion points and reflections:

The first point of discussion was prioritization of specific pillars of sustainability and their overlap. It was brought up that for the areas of social and economic sustainability and the areas where these two overlap with ecological sustainability, there are often already measures in place, while for ecological sustainability, specific guidelines have yet to be formulated. Because of this, priority is often given to ecological sustainability, specifically by the Max Planck Sustainability Network.

In relation to this, the plenum discussed an example of prioritization: It was brought up that, in scientific institutes that work on topics that do not require problematic materials and large amounts of energy (such as humanities or history research), it might be difficult to decide which sustainability measure to implement first. One solution given was to start with the aspects that all research practices share, such as electricity and heating generation/consumption and travel and their respective carbon footprint. It was also brought up that raising awareness for the sustainability topic and inspiring a culture of sustainability should be strived for in the long term.

Next, the differentiation between research for sustainability and sustainable research was discussed. It was brought up that sustainable research practices apply to all science areas and research projects, and that there is a danger of diluting the mission of making science and research more sustainable when research *content* is taken into consideration, as this affects scientific freedom more drastically, which in turn might create more negative attitudes towards sustainability. However, if scientific freedom of research and topic choice are left alone, the idea of making research practices more sustainable can still be applied.

After this, potential connections between the activities were discussed. In sum, it was derived that exchange platforms, both within and across organisations, are needed, and that transparency and contacts between policy makers are both critical.

The next discussion revolved around current challenges for technical sustainability solutions, such as photovoltaic installations. It became clear that the hindrances were diverse, including, for example, economic, juristic, and delayed-effects difficulties.

The closing discussion point was the distribution of work capacity in sustainability initiatives. It was concluded that most of the work is actually done voluntarily, and in order for these movements to gain more traction and to become more effective, that needs to change. Specific positions for sustainability-related tasks need to be created, which would enable people to devote a lot more time and energy to the cause.

## Main results and conclusions

As addressed above, this session was only marginally related to the topic of mission-oriented research and development, which makes it difficult to draw conclusions in relation to that. However, the key points of the presentations and discussions were as follows:

It is sometimes necessary to prioritise a specific pillar of sustainability over the others, given differences in research methods and ways of working. However, research can be done (more) sustainably across all research areas, which means that all aspects of sustainability can and should be taken into consideration by the respective initiatives. To achieve the ambitious goal of making science and research more sustainable, connections between the big science organisations and institutes are necessary, wanted and helpful.

Since much of the sustainability work is done voluntarily, it takes time. Given the importance of the topic and current development of the world, this needs to change, for example through changes in the funding structure or through official appointments of institute directors and work councils. Overall, more people whose main task is to work on sustainability are needed.

Overall, research for sustainability is highly important, but does not affect all research areas – however, sustainable research *practices and methods* do. Therefore, a future mission should be to apply the pillars of sustainability and sustainable development to all areas of science and development, regardless of the respective topic. The most important open question is how exactly this can be achieved, but many practical ideas already exist and are being implemented.

## Session 9: How can criteria for socially responsible research facilitate mission-oriented research

Session organiser(s):

**Prof. Dr. Rainer Danielzyk**, Secretary General, Academy for Territorial Development in the Leibniz Association (ARL)

**Prof. Dr. Katharina Helming**, Working Group: Impact Assessment of Land Use Changes, Leibniz Centre for Agricultural Landscape Research (ZALF)

**Prof. Dr. Achim Schlüter**, Department Head (interim): Social Sciences, Working Group Leader: Institutional and Behavioural Economics, Leibniz Centre for Tropical Marine Research (ZMT)

Session description:

As the state of knowledge increases and science becomes differentiated, research processes are becoming increasingly complex. The resulting challenging situations require an integral approach to research as well as the feedback of its activities and results into social discourse. The **framework for reflection 'Socially responsible research'**, developed in a joint project called LeNa, was derived with precisely this aim, of taking an integral approach by encouraging critical and systematic reflection on the entire research process.

The session focused on the question, how criteria for socially responsible research can facilitate mission-oriented research. At the beginning, the organizers of the workshop introduced the LeNa project and eight criteria. Then, two of the five EU-missions for 2030 (soil and oceans) were presented by experts of these fields to lead over to a joint discussion.

The first LeNa-project ran from 2013 to 2016. Beside the framework for reflection, it has developed a 'Sustainability Guide – Sustainability management in non-university research organizations'. This project had a wide range of different issues, ranging from personnel to governance to research. The focus has been on the sustainable mode of research, not on sustainability as a tool or content of research. "Research" as a field of action deals with good scientific practice, researching with social responsibility and contributing solutions to societal challenges. This resulted in the "Reflection Framework for Socially responsible research" with eight criteria of responsible research. A follow-up project called LeNa Shape has started in 2021.

The criteria for research in social responsibility are an essential result of the LeNa-project. To figure out these criteria the main question is: What makes research socially responsible? Based on a literature review the research team identified the top eight criteria for socially responsible research, namely: transdisciplinarity, interdisciplinarity, ethics, user-orientation, complexity and uncertainty, integrative approach, reflection on impacts and transparency. Improving the social responsibility in research processes through the reflection on the eight criteria during all stages of research processes by PhDs, PostDocs, scientific managers, or senior researchers for example and per research project is of importance for contributions to sustainability transformation in science and society.

The European Union has defined five missions to be achieved by 2030 based on coordinated research. Two guests presented the missions 'A Soil Deal for Europe' and 'Restore our Ocean and Waters'. The soil deal for Europe includes 100 living labs and lighthouses to lead the transition to healthy soils by 2030. The overall objective is to have healthy soils in Europe by 2050.

The mission 'Restore our Ocean and Waters by 2030' follows a systemic approach and integrates lighthouses to demonstrate, develop and deploy activities – across EU seas and river basins. Objectives include to protect marine ecosystems, to prevent pollution and to make the blue economy carbon-neutral and circular. The EU-Mission criteria are linked to the LeNa approach as they also refer to social relevance, fixed goals, and cross-disciplinary collaboration.

Main discussion points and reflections:

The joint discussion raised different issues regarding single presentations and intersections. It became clear, that the selection of criteria under which the missions are chosen also partly reflect the eight criteria for socially responsible research. Interdisciplinarity is a key target or concept for the missions so all of the missions will have projects that are looking specifically in interdisciplinary approaches as well as in arts and culture trying to mobilize those who support the mission's objectives.

Especially in ocean research, there are debates on the sustainability or the ecological footprint of research, which is a contested point. There are many perspectives for ethical reflection not only on the goals but also on the means because they justify the outcomes.

The integration of data knowledge is a major task and the key challenge in the ocean mission. It is designed as an open and inclusive model, however, against the backdrop of the long history of monitoring and observation in the ocean. In addition, a modelling is used to understand the oceans.

There is a dilemma to define what healthy soils are: in a language that is easy to understand but also precise in a scientific way in the same time.

A difference between the soil mission and the ocean mission is that the first one is not based on policies: A European soil law does not exist yet, in contrast to surface water and groundwater, which have a long policy history. In addition, the society has a stronger emotional connection to the ocean, because the consequences of the ocean destruction are more tangible for the people. The citizen connection therefore is a very important point and challenge. By contrast, regarding soils the criteria of complexity and uncertainty are more relevant than regarding the oceans.

There are already several projects dealing with transdisciplinarity and interdisciplinarity. The use of the other criteria is less explicit. Regarding the question how to foster the type of socially responsible research, the framework conditions of research need to change in terms of time and financial resources. These framework conditions are a key element for socially responsible research.

Main results and conclusions:

Science has moved to a period, where scientists increasingly reflect the consequences of research. Many researchers see themselves as part of societal debates. Therefore, research for science's sake is questioned from different sides. The EU-missions clearly have a societal connotation. In general, it is important that the framework conditions in research processes change to better enable or establish socially responsible research.

## Session 10: Missions for Sustainability from a historical perspective

Session organiser(s):

**Jun.-Prof. Dr. Tina Asmussen**, Deutsches Bergbau-Museum Bochum (DBM, *German Mining Museum*)

**Prof. Dr. Matthias Hardt**, Leibniz Institute for the History and Culture of Eastern Europe (GWZO)

Session description:

This session consisted of three short presentations and a general discussion. The first presentation by Matthias Hardt started with an explanation of the term “Mission” in the light of Christian missionary activities from the early medieval period onwards. He then turned to the institutional framework of those missionary activities, the monasteries, which at the same time were strongholds of agricultural knowledge and its perpetuation from antiquity. He showed the development of monastic living and working communities in the eastern Mediterranean and their spread throughout Europe. Especially the Frankish Kingdom stimulated the expansion of these monastic institutions from the 8th century onwards. Prayers and strict working condition were combined with literary education in these monasteries, the Scriptoria formed places of the tradition of ancient and Arabic knowledge. He then continued with the Benedictines, who became powerful landowners, only surpassed by the king. Their fields were primarily used for the cultivation of cereals, with the consequence of a remarkable demographic growth. Matthias Hardt demonstrated the effects of that growth highlighting the transformative effects on landscapes east of the Elbe and Saale region. Especially the erosion of soil, floodings and diseases were typical effects of this abundant cultivation. Reflecting on and considering the unintended consequences of mission-oriented approaches to sustainability was the concluding point of this paper.

The second talk by Pietro Omodeo addressed Sustainability in the Light of Venice’s Hydrological Culture in the Early Modern Period. Starting with the long history of artificial water regulation systems in Venice and the need to preserve them, Omodeo pointed out how the regulation of the rivers transformed waterscape and landscape in profound and irreversible ways. Especially the regulations sanctioned by the city’s administration on water management and control showed not only their concern with aspects that we now call sustainability but also had a remarkable participatory element, such as the interviews with local fisherman. As Omodeo pointed out, as early as 1537 we find a decree by the Water Officers that shows the consultation of local knowledge from fishermen. This underlines the importance of the history of hydrocultural management for today, as participation looms large.

Tina Asmussen started her presentation with the argument that in contrast to the modern period there was no clear-cut distinction between renewable and non-renewable resources. Natural philosophers but also practical miners perceived minerals and metals as vital and regenerative materials. It was believed that they grow in the underground similar to plants and were influenced by the planets. They were perceived as gifts of God and subjected to divine providence. This dynamic and religious conception of mineral matter cannot be understood with a modern utilitarian and economic understanding of resources, far more it was intertwined with cosmological ideas moral virtues and spiritual believes. Tina Asmussen further mentioned that long before the enlightenment and the industrial revolution people cared and reflected and cared about resource use and consumption. Her conclusion was that this very different conception of mineral resources in the past should remind us today not to generalise and universalise a western, modern, rational and secularised understanding of science, technology, and innovation. Provincializing this understanding is urgently needed not only when considering the preindustrial past but also when it comes to the discussion of mission-oriented approaches in global perspective.

Main discussion points and reflections:



After the three lectures, the three speakers had a vital discussion on different topics. Three points shall be highlighted: First, how to trace and investigate the unintended effects. Considering unintended effects need an interdisciplinary approach with methods from the humanities and natural sciences. The second major discussion point was the role of Christianity, and religion in general, as an important factor of shaping people's perceptions of nature and their own place in it. This aspect is often excluded when speaking about nature, the environment or sustainability. The third point was the importance to reflect on sustainability missions not only as a top-down process but also as a bottom up. The participatory element which was underlined by Omodeo and Venetian water management needs to be more fully incorporated for today's discussion of sustainability missions. This also counts for the important of the commons in political, economic and public discussion on sustainability missions.

Main results and conclusions

Mission oriented approaches need to....

...include possible unintended consequences of "Missions for Sustainability" into our planning processes today.

...include participatory knowledge and policies of the commons.

An important mission for mission-oriented approaches for RTI is to decolonise the past and provincialize the present

Unfortunately, the session on historical aspects of sustainability missions could not raise the attention and interest of the conference participants. For the future we have to find a different way of how to implement a more holistic perspective on sustainability missions.

## Session 11: Mission-orientation in local economic development

Session organiser(s):

Moderator:

**Dr. Judith Terstriep**, Institute for Work and Technology, Westphalian University Gelsenkirchen

Contributors:

**Oliver Peters**, German Institute of Urban Affairs (Difu)

**Sandra Wagner-Endres**, German Institute of Urban Affairs (Difu)

**Maria Rabadjieva**, Institute for Work and Technology, Westphalian University Gelsenkirchen

Session description:

Mission-oriented policy has gained momentum in recent years as a response to the grand societal challenges reflected in multiple national and international political agendas. The formulated missions call for participatory approaches involving actors from all societal sub-systems (policy, administration, economy, academia and civil society). However, governance of missions at a local level, particularly in the framework of economic development, is so far poorly understood and not yet in the focus of the current debate on mission orientation. In the sustainability discourse, municipalities do have several concepts at their disposal, such as the 2030

Agenda, the common good economy, the doughnut economics or the circular economy, for implementing a sustainability mission. However, these concepts need to be adapted locally. In order to establish mission-oriented local economic development, local economic development agencies, in particular, are called upon to further develop their work in terms of content and organisation through new thematic and structural formats. The session discussed the role of local economic development and the potential of participative governance approaches in implementing political missions based on local challenges.

The session first addressed the question of how to operationalise local (economic) sustainable development for municipalities? Further, the role of local economic development in sustainability transitions was discussed: What is the place of local economic development in achieving missions? How can missions for local economic development be governed so the set goals are achieved in the set timeframe?

The questions were addressed within three contributions and a joint discussion between the referees and the participants. In the first input, Oliver Peters (Difu) presented an assessment of sustainable concepts and discussed their applicability to municipalities. The input concluded that none of the concepts is developed specifically for use in municipalities. Adaptation and translation for the local level are highly needed and require, to varying degrees, additional knowledge and resources, which municipalities often don't have. Second, Sandra Wagner-Endres (Difu) gave an overview of the reorientation in local economic development (LED) in Germany and emphasised its role in achieving sustainability transitions. Mission-orientation in LED requires an appropriate innovative capacity of local development agencies (LDA, Wirtschaftsförderung). LDAs have to understand themselves as a representative of the public, focus on new topics and stakeholders, and allow transformative learning processes in their own organisations. Innovation, the common good, sustainability and resilience must be established as new overall targets beyond economic growth. This way, LDAs can become a game-changer in local mission-orientation. Finally, Maria Rabadjieva discussed the potential of participative governance approaches for implementing missions for local economic development. A balanced scorecard for joint strategizing and real-world laboratories for project development and implementation were presented as examples of participative formats for LED in accordance with the mission-oriented framework by Mazzucato, tested by the LDA in Bottrop. Participative governance needs transparency, involvement and interaction between actors. Different formats can be applied depending on the purpose, local factors and degree of engagement.

Main discussion points and reflections:

A point was made that when talking about the development of cities, the discussion of de-growth is unimaginable. Cities are still striving to grow. It was also made clear that even in Germany, the recommendation for reorientation of LDAs and increase of innovative capacity are still in development. Most LDAs work on professionalization, some on reorientation.

From there, the discussion focused on the difference between the European countries. While Germany with its decentralised structure of local economic development, has resources (not just economic but also experience) to pursue missions on a local level (an example is Dresden as "Zukunftsstadt" (future city), other European countries especially smaller ones as Estonia, which are organised centrally, do not. Small countries are struggling with local governance, which poses the question: how can centralised countries with no local development agencies

implement sustainability on a local level? In some cases, it is possible for cities to take the lead and interfere in local economic development. Here learning from partner regions can be helpful. An example was given with Tallinn, which is influenced by Helsinki – a very developed region. The collaboration between cities shows the potential and possibilities of local sustainable development.

Main results and conclusions:

Sustainability concepts (e.g. Doughnut Economics) remain abstract and not tailored to the local level, although they are expected to implement missions. The greater the need for translation or adaptation and the lower the resources for it, the lower the manageability and attractiveness of the approach for municipalities

Mission orientation in local economic development requires the innovative capacity of local economic development agencies, which involves a focus on new topics, openness to new stakeholders and transformative learning in the own organisation.

Participative governance is a tool for achieving missions for sustainability at a local level. It requires, however, high levels of transparency, joint responsibility and active engagement of all the actors.

## Session 12: Engaging everyone in the SDGs: citizen science and participatory approaches

Session organiser(s):

Moderator:

**Dr. Claire Murray**, European Citizen Science Association

Contributors:

**Dr. Dilek Fraisl**, International Institute for Applied Systems Analysis (Austria)

**Meschack Odede**, Vio Society (Kenya) and Africa4SDGS

**Dr. Peter Elias**, University of Lagos (Nigeria)

Session description:

Reaching the SDGs (Sustainable Development Goals) without actively involving citizens and the community in the process is an impossible task. Citizen science therefore creates an opportunity to bridge the gap between the theory and the reality of sustainable change by directly engaging and empowering citizens. Short presentations will address the questions of what citizen science is and how it can contribute to the SDGs will be discussed, followed by practical examples of how scientists and communities are already using citizen science in their work towards the SDGs. The session will have plenty of opportunities for discussion and reflection, to enable participants to explore the potential for citizen science in their own work.

Main discussion points and reflections:

The definition of citizen science is broad, but in general we can say that in citizen science, the public participates voluntarily in the science process, addressing real-world problems in ways that matter to them, formulating research questions, conducting scientific experiments, collecting and analyzing data, interpreting results, making new discoveries, developing technologies and applications and solving complex problems. In the context of SDGs citizen science enables scientists and public to work together to ask questions and solve problems, thereby working towards achieving the SDGs.

Citizen Science has great potential to fill data gaps in the SDG indicator framework. The greatest contributions could be made to SDGs 15 (life on land), 11 (sustainable cities and communities), 13 (good health and well-being), 6 (clean water and sanitation). Data collected by volunteers could e.g. be used to generate information on water quality at the community level. In order to design the data collection process in an efficient and sustainable way, it is crucial to create time and space for government, international organizations and citizen science organizations to meet and build trust, common goals and ownership over the result. It is useful to tap into already established and sustainable networks, where data could be collected as a by-product of existing activities. To realize the potential of citizen science for SDG monitoring (1) awareness needs to be raised and experiences shared on the use of citizen science, (2) case studies need to be developed to demonstrate the potential of citizen science at the global level, (3) criteria and processes need to be identified for ensuring data quality and data quality assurance procedures, and (4) consistent data collection across citizen science initiatives needs to be promoted aligning definitions with global frameworks.

One practical example is provided by the Task Group on Data from Participatory mapping for the SDGs. The initiative aims to study data on environmental changes generated by participatory mapping projects and platforms for specific requirements of the SDG Results Framework with specific focus on African countries.

Another practical example comes from the Africa for SDGs campaign, which seeks to promote participation in the realization of the SDGs in Africa by mobilizing and providing platforms that activate conversations and forums to increase awareness of the SDGs in order to come in with innovative, implementable and scalable ideas that meet urgent social, economic and environmental challenges facing the African continent. Due to Africa's demographics and their position in society there is great potential in involving specifically young people in citizen science projects. Therefore, a SDG fellowship program has been set up, where young people are trained as citizen scientists to be empowered to generate data themselves and train others to collect data in their communities.

Main results and conclusion:

- We cannot achieve what we cannot measure. All data sources have limitations and advantages, but to reach the SDGs we need to harness the potential of new data sources like citizen science.

- When solutions to problems within communities come from outside, the community will struggle to embrace it. For true sustainability, we therefore need inclusive decision making and innovation, with active rather than passive roles for citizens.
- Data inequality and trust issues mean governments and policy makers do not have the full story for challenges in sustainability. Partnerships with community organizations through citizen science is one way to bridge these gaps.

## Panel discussions

### Panel discussion 1: Sustainability and path-dependency of mission-oriented R & I

Moderator: Prof. Dr. Marc Wolfram (IOER)

Speakers:

Dr. Lea Fünfschilling (CIRCLE, Lund University)

Prof. Dr. Uwe Cantner (Chairman Commission of Experts: Research and Innovation)

Prof. Dr. Rainer Walz (Fraunhofer Institute for Systems and Innovation Research ISI)

Dr. Dietrich Nelle (German Federal Ministry of Education and Research, Strategies and Policy Issues)

The mission approach aims to put innovation activity to the service of the SDGs and a transformation towards sustainable development. This raises questions regarding the normative core of mission objectives and their dis-/alignment with existing implementation arrangements and scientific paradigms. The aim of this panel was to discuss the core challenge that results from confronting the mission approach with sustainability transformations and its implications. What can the mission approach contribute to achieving sustainability? What are the challenges and contradictions, if current innovation systems confront sustainability transformations?

- Missions often still lack concrete statements of what components of a system need to be dismantled to move towards transformation. These must be specifically addressed in the mission design.
- The development of missions needs to be a collective endeavour. Different levels of governance need to be involved at all stages of the mission development. Inter-ministerial competencies need to be joined in a cross-sectoral approach.
- Due to the high degree of uncertainty connected to transformation there is not THE right and only way of designing and implementing a mission. Technical openness, 'competition for solutions' and space for adaptation is key for designing a mission in a sustainable way.
- Citizens must be involved in the mission design from the beginning, not only including structures of participation, but enabling citizens to participate in a meaningful way e.g. through education. Simultaneously, scientists and scientific evidence must be included in decision-making processes. This raises questions of responsibility of science and scientific freedom.

- As transformative change is radical and often leads to dismantlement of whole systems and structures, political transparency, accountability and clear and concise communication are crucial so that affected groups of society do not feel excluded.
- Missions need to deliver concrete milestones within the timeframe of a legislative period in order to ensure and improve political agreement.



*Panel discussion „ Complexity and multi-level implementations of mission-oriented R&I“, Roman Mendle, Dr. Philip Larrue, Prof. Katharina Helming, Dr. Neville Reeve (from right to left)*



## Panel discussion 2: Complexity and multi-level implementations of mission-oriented R&I

Moderator: Prof. Dr. Katharina Helming  
(ZALF)

<p>Speakers:</p> <p>Dr. Philippe Larrue (Policy Advisor, Directorate for Science Technology and Innovation (DSTI), OECD)</p>	<p>Roman Mendle (ICLEI Europe, Coordinator Sustainable Resources, Climate and Resilience)</p> <p>Dr. Neville Reeve (Head of Missions, EU Commission)</p>
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The mission approach requires engagement from a wide range of sectors as well as close cooperation between science, policy and society at different levels and across diverse policy fields. This raises questions concerning the challenges for boundary-crossing coordination (territories, domains, sectors) and subsidiarity. The aim of the panel was to discuss how to effectively implement missions addressing all levels of governance. How can missions become embedded within different sectors and at different levels? What are the requirements in terms of participation and effective social learning?

- Approaches at national level are deeply embedded within national strategies. It is key that countries repurpose, reorient and connect already existing national and communal structures and instruments. Learning mechanisms need to be established in order to enable countries/regions to share their lessons learnt and embed them in the decision-making process.
- Multi-level governance including all levels and the horizontal as well as vertical dimensions is essential including regimes at different governance levels e.g. SDGs, Paris Agreement, NetZeroCities.
- The systems that need to change in order to reach the mission targets need to be identified. Citizens must be included at all stages of the process.
- Local sources for financing missions long-term are key in contrast to public funding, where most of the money currently comes from. To achieve this some countries e.g. Sweden, UK, Netherlands have attempted to formalise commitment of private and public stakeholders.
- While the core of the mission design and implementation in countries like Germany is still based in the research and innovation area, cross-sectoral and cross-ministerial approaches should be upscaled.
- Research and technology organisations act a system intermediaries. They play a pervasive role in the coordination of missions. Institutional funding for them must be ensured.

- Mission-oriented policies are nascent, but have the potential to become a platform for negotiating collective action to address one specific mission, which citizens have co-created.



*Panel discussion „Sustainability and path-dependency of mission-oriented R&I“, Prof. Uwe Cantner, Dr. Lea Fünfschilling, Dr. Dietrich Nelle, Prof. Marc Wolfram, Prof. Rainer Walz (from right to left)*

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