Designing missions for sustainability transformations

Position Paper

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Background

Given the outstanding challenges humanity is facing today (climate change, biodiversity loss, environmental disasters, infectious diseases or forced migration, to name but a few) there is a turn towards forms of transdisciplinary action that promise rapid and decisive socio-ecological transformation: By focusing on ambitious goals to meet the challenges, concentrating resources, combining research with diverse policies and instruments and pursuing a tight timeline, **missions appear to be the necessary research and innovation (R&I) corollary of the Anthropocene**. Missions seem to be the most encompassing and complex science-policy lever conceived of up to now – so as to still get our act together and transform our societies before reaching critical thresholds and tipping points of the Earth system.

Missions as such, however, are of course nothing new. Since the 1960 we can find examples of national R&I policies from across the globe that have adopted this approach or some variation of it (EC, 2018). Drawing on experiences with "missions" in business and organisation development, this initially meant a significant upscaling of the approach, already including the coordination of a range of instruments, scientific disciplines and also stakeholders, although primarily in business and industry.

What would be entirely new then is the orientation of missions at the "**glocal" challenges of sustainability transformation**. This is not just about changing objectives (i.e. replacing "moonshots" with "climate resilience"). Sustainability transformations raise a number of fundamental questions that require to rethink how mission-oriented R&I works, and how its policies and instruments need to be designed and embedded in societies – across scales, domains, sectors and territories. These are questions that are equally essential to current debates in the sustainability sciences:

- **Normativity**: What should missions aim to achieve? By what ethical standards and on what knowledge basis does mission design assess and prioritise? Perhaps there is agreement about the need to decarbonise – but there are many pathways with different solutions (for instance nuclear or renewables). How do missions arbitrate between goals or solutions, and what is the role of science in this?
- **Trade-offs**: Formulating missions and prioritizing societal goals also implies to confront goal conflicts that are partly hard or even impossible to resolve. How can the mission approach ensure to anticipate necessary trade-offs in time without compromising its own conception (since the mission will have to opt for one path)? What procedural designs would allow to identify, assess and cope with trade-offs both ex-ante as well as during mission implementation?
- **Legitimacy**: How do missions relate to democratic representation and decision making, as well as universal rights? If they are striving to fundamentally change societies, does R&I bypass parliaments and subsidiarity then? And what about those *not* represented but affected, without resources and a powerful voice, or simply living in other

parts of the world? How can we create global missions for sustainability from the bottom-up or through joined-up governance, so that they actually "leave no one behind"?

- **Path dependencies**: Missions are largely shaped by the *existing* R&I systems and these were created to foster national growth and competitiveness. If missions build on institutionalised relations between science, policy and society, and between people and territories, how can they actually transform these? Do missions for sustainability not require both path breaking and creating dynamics, thus shaping entirely new innovation ecosystems to enable a second deep transition and a postgrowth future?

- **Transformativity**: Transformation research points towards a wide range of conditions and dynamics that influence whether and how complex adaptive systems destabilise, reconfigure and transform. But to what extent do missions actually identify and address these conditions? Do they really focus their efforts on contingent systemic leverage points and regime change, or does their scope remain limited to (selected) niche developments?

- **Scientific freedom and excellence**: 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 questions and priorities. To what extent can societal relevance form a condition for (publicly financed) research, and how can this be assessed? Is there a need for redefining scientific excellence as a core criterion for scientific performance? What balance and relations should be established between research aligned through missions and other research?

- **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. In particular, such learning must go beyond policy domains, societal sectors, government levels *and* territories, addressing individuals, collectives and social networks. 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?

In the light of these fundamental challenges and questions but also considering the current deployment of mission-oriented R&I policies at European as well as national levels, the Leibniz Research Network "Knowledge for Sustainable Development" focused its international conference 2022 (5/6 May) on this evolving R&I paradigm. Under the title **"Missions for sustainability: new approaches for science and society"** the event was meant to support reflexivity and exchange about designing missions *for sustainability transformations* considering both the policy frameworks required for missions as well as their implementation through transdisciplinary research.

To this end, a wide-ranging community across disciplines and sectors was invited, including not only those studying mission-oriented R&I, but also researchers, policy makers and stakeholders engaged in practically co-shaping and implementing missions in diverse domains.

The interactive program hosted at the Leibniz Headquarters in Berlin as well as online offered diverse hybrid formats for inter- and transdisciplinary debate, including two keynote sessions, two panel discussions and 12 thematic sessions.

Designing missions for sustainability transformations (MST): Seven key lessons

Based on its analyses realised in preparation for the conference, exchanges with the scientific advisory committee[1] and especially the input of and discussions with invited experts and participants during the event, the steering group of the Leibniz Research Network has distilled the following seven key lessons for designing future missions for sustainability transformations (MST). Overall these lessons are aimed at maximising the positive impacts of mission-oriented R&I on transformations towards sustainable and resilient societies while containing potential major risks, addressing trade-offs and ensuring justice and legitimacy.

1) *Deliberate normativity*: MST must be based on inclusive and meaningful societal participation and co-creation from the outset to define acceptable transformation norms. This concerns especially the framing and prioritisation of challenges and the mission goal, but should be ensured throughout all design and implementation stages.

- Participation and co-creation needs to involve citizens, stakeholders and scientists from a very early stage and at eye level in order to juxtapose the available knowledge and to deliberate values and norms for future development.
- As MST are about purposive societal change, science can and should not define mission orientations and ambitions alone. Yet, science provides critically relevant knowledge, methods and tools for stakeholders to make informed and wise decisions in this regard.
- It is not enough to just provide open structures for participation (e.g. platforms, arenas). Meaningful involvement for deliberating normative questions must be enabled proactively by providing resources (information, space, time, skills, etc.) and through diverse means of education, while attending issues of balanced representation and intersectional oppression.

2) *Disrupt systemic path dependencies*: MST must move beyond widely established notions of "innovation" and a narrow focus on technological solutionism. While research and technological development (RTD) remains an important element, MST must embrace the dynamic co-evolution of a much wider range of components of social-ecological-technological configurations, ensuring reflexivity about their own path development (cf. lesson 7 below).

- Beyond technological innovation, transformations critically depend on deep *socio-cultural change* concerning a wide range of institutions, regulations, business models and practices. The need for diverse *social innovations* may in fact be far greater than

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the need for technological novelties, considering the widely acknowledged "implementation gap". In turn, technological fixes run the risk of undermining deeper transformative change, especially where offering short-term economic benefits.

- Correspondingly, there is a need to effectively tap the potential of *alternative innovation ecosystems* (e.g. grassroots initiatives, social entrepreneurship) as they often tend to combine various forms of innovation (technological, institutional, behavioural) and more diversified value propositions (ecological, social, economic).
- To leverage the diversity of innovations required, it also needs involvement of the *full range of scientific disciplines*. Beyond the natural sciences, engineering and economics especially other social sciences and humanities can offer key insights to grasp the multifaceted conditions for and directionality of socio-economic, socio-technical and socio-ecological change at individual, organizational and societal levels.

3) *Articulate transformative goals***: MST must abandon modernist narratives of perpetual growth but clearly embrace the need to phase out current systems in order to develop new ones.** Destabilization, break down and exnovation should be understood as necessary components of MST as they form a corollary if not precondition for the creation of novel and more sustainable pathways (Hebinck et al., 2022).

- Transformative change necessarily leads to the dismantlement of whole systems and structures. However, missions often still lack concrete statements of what components of the current systems are actually dysfunctional, and what sustainable system designs are targeted. Instead of practicing "blame avoidance" and postponing such insights, it would be crucial to clearly identify at an early stage of the formulation process of an MST what needs to be dismantled and abandoned, as well as what the transformation aims to create.
- Therefore, also inclusion of those facing negative impacts by the fade-out of a system (component) is particularly important, enabling them to voice their needs and concerns while also clarifying responsibilities and taking action for mitigation.

4) *Ensure joined-up governance and legitimacy:* **MST scope and governance must essentially build on existing structures but** *also* **establish new ones in order to achieve an effective leverage across boundaries**.

- In practice today there is a clear discrepancy between the scope and ambition of missions and the structures in place for their implementation. MST require a multi-level and joined-up governance approach across authority levels and societal sectors (public, private, civil) as well as the relevant policy domains and territorial boundaries. Yet they should remain specific and concrete enough, indicating quantifiable targets to develop directionality while avoiding "dissipation" between a multiplicity of actors, domains, instruments, etc.
- Mission approaches are deeply (and differently) embedded within national strategies of research and innovation policy. Therefore, it is particularly effective if countries *re-*

purpose, reorient and connect already existing structures and instruments of these policies. Novel approaches should be created only selectively to fill strategic gaps (e.g. for participation and joint evaluation).

- The governance approach and portfolio for mission implementation needs to go decisively beyond just research & innovation and should be scaled and integrated into the *relevant policy domains* instead. For better involvement of stakeholders, R&I should become more of a facilitator and contributor instead of a process leader. The aim should be to create broad co-ownership and co-financing streams way beyond government R&I funding.
- *Research assessment* provides an important input to identify suitable governance structures and infrastructures for implementing missions, as well as for scoping the possible impacts of different mission designs.
- To practically advance MST at national level achieving *political agreement* between the principal decision makers (MPs and parliamentary groups) is fundamental, taking into account the limited legislation periods of parliaments and ensuring that key milestones can already be delivered within these timeframes.

5) *Renew understandings of scientific freedom and excellence:* MST require to revise current understandings of scientific excellence and to overcome mainstream interpretations of scientific freedom as a negative liberty. Responsible science that contributes to tackle key societal challenges is in fact also excellent science – especially under the conditions of the Anthropocene.

- To enable the necessary contributions from science to MST, current science systems must embrace the various long-standing calls for revising research assessment standards (e.g. Leiden Manifesto, DORA, Paris Call), acknowledging the diversity of scientific cultures, as well as inter- and transdisciplinarity and societal relevance as features of scientific excellence.
- There is a need for *fundamental as well as application-oriented and applied research* in MST involving all strands of science in an outstanding *interdisciplinary* endeavour. Similarly, the need for integrating non-scientific knowledge and experience through *transdisciplinary research* forms a highly demanding scientific task. Both requires corresponding acknowledgement and quality criteria for assessment.

6) Explore sustainable *trade-offs*: MST must be capable of handling complexity, uncertainty and risks without compromising their goals. Search processes including foresight, experimentation, diversification, failure and learning are needed to guide MST.

- *Foresight approaches* (e.g. participatory scenarios and modelling) should be built into MST to figure out potential disruptions in the system(s) as well as bottlenecks, lock-ins and emerging pathways in order to inform choices regarding sustainable trade-offs that can attend justice across space and time.
- To achieve the best possible outcome of a mission, *technology choices should be kept open* until the most sustainable solutions have been demonstrated. Under the um-

brella of an MST alternative technology options to achieve targets (e.g. carbon neutrality) should be able to freely compete and become tested. However, it is crucial to define when testing has to end and implementation needs to start.

- *Social learning* (in all its facets) through MST needs better conceptualisation and a dedicated approach at individual, organisational and societal levels. There is a wide range of highly relevant theories, methods, techniques and practices which currently remain disregarded but that need to be brought together in order to instruct effective social learning through MST.

- *Living labs (or real-life laboratories)* offer an important experimentation and sensing approach for negotiating trade-offs and (re-) directing transformation pathways within an MST. They enable continuous insights into the process dimensions as well as the impacts and scaling of solutions. Especially *place-based living labs* are capable of addressing the more complex challenges dealt with by MST in an integrated way.

- While setting targets initially is essential, MST must be prepared to *preserve flexibility* and respond to (sudden) changes in development conditions or dynamics, as well as unexpected events, thus revisiting targets and strategies accordingly at any given time. As the Russian war on Ukraine has demonstrated only recently, fundamental assumptions can become questioned overnight, which urges for high precaution in defining independent variables.

7) *Incorporate social learning*: MST should structure a continuous, open and transparent learning dialogue between science and society. Such a dialogue should also seek to gradually link global to local levels in order to gradually align norms and priorities, deliberate alternative solutions and pathways, and derive tailored programs for place-based implementation.

- *Mission-oriented learning mechanisms* need to be established in order to enable countries, regions, and localities, organisations, collectives and individuals to share their lessons learnt from each other through MST and embed these lessons in their respective decision-making processes. In particular, this should also embrace the *existing educational institutions* and contribute to further develop approaches and practices in support of life-long learning.

- *Evaluation and monitoring* of missions at different stages of design and implementation are therefore key to capture progress towards targets, despite the complexity of the process. Especially regarding the long lifespan and broader scope of MST, *milestones and indicators for the short- and medium term as well as for different scales* (local, regional, national, global) are important to reflect progress for all stakeholders, and to timely recognise a possible need for more fundamental revision.

- MST are particularly dependent upon continuous stakeholder inclusion and broad ownership - also in the face of setback and failure. *Transparency and accountability* are therefore crucial principles that must be safeguarded by decision-makers at all stages, constantly evaluating progress and communicating about learnings and adaptations with stakeholders.

Follow up and outlook

With the present position paper the Leibniz Research Network "Knowledge for Sustainable Development" hopes to both synthesise and advance the discussions on designing *missions for sustainability transformation (MST)*, catalysed through the conference in May 2022. The key lessons are thus also meant to offer a shared reference for ongoing dialogues in various pertinent policy making contexts. This includes especially the European Research Framework Programme (Horizon Europe) as a key vehicle for the deployment of mission-oriented R&I in Europe, also with a view to new mission topics currently under discussion. It equally applies to the draft of the German federal government's future R&I policy framework (Zukunftsstrategie Forschung und Innovation), which is in a final consultation and elaboration phase at present (BMBF, 2022).

Therefore, this position paper will be shared widely with stakeholders as an input to ongoing policy design, implementation and evaluation. Furthermore, in the context of its dialogue and co-creation formats, the network will follow up regularly on the status of mission-oriented R&I in Europe to reflect about emerging research and policy requirements.

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Leibniz Research Network "Knowledge for Sustainable Development"

The network was founded in 2020 by five institutes of the Leibniz Association. It aims to bundle and connect research competencies in the sustainability sciences within the Leibniz Association and beyond, giving new impetus to the field and contributing to its effectiveness and visibility. The network organises different strategic dialogue and co-creation formats with partners from science, policy and practice.

Leibniz Research Networks focus on a particular key topic or technology. They form a communicative platform where the participating institutes can exchange subject-based, methodological and technical expertise and develop it further. Leibniz Research Networks are set up by the Executive Board of the Leibniz Association at the request of the Leibniz Institutes.

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