Missions for sustainability: New approaches for science and society

Session abstract

Template for session organizers

The session abstracts should provide a brief overview of the session scope and design and a **synthesis of the key discussion points and results** of each session. They should always position the issues addressed in **relation to the programme** of the conference.

The session abstracts will serve to prepare a **conference documentation** for dissemination to the interested general public (PDF). They may equally be used as a basis for producing a summary in other formats (multimedia). In addition, these abstracts will inform a **position paper** on mission-oriented research and innovation, prepared by the Leibniz research network after the event.

Please do not attribute statements to individual participants (results-oriented abstract)

Please use accessible language / English only

Total length: ~1500 words

Session organizer(s)

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Session title

Mission-oriented Research in Agriculture and the Bioeconomy

Session description (~500 words)

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 organizers 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 biobased 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.

[1] https://leibniz-innohof.de/en/

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 (~500 words)

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 emphasized 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., inhouse 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 (~500 words)

- 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.