Designing a Metascience Institute

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Abstract

This proposal outlines an open, transparent and collaborative process to design a Metascience Institute that would apply the scientific method onto itself, with the mission to improve the research landscape systemically in terms of maximizing societal benefit and public documentation thereof. This facility is envisaged to engage in the systematic study of the research ecosystem, initially at a national level in Germany but later on also in other contexts. As such, the Metascience Institute would assess systemic properties, interactions of different components within and beyond the research system and how the roles played by various components are aligned with goals of relevant stakeholder groups and broader societal benefits. Collaborating with any interested stakeholders on an initially narrow yet steadily expanding range of intra- and transdisciplinary use cases and using an appropriate mix of experimental, theoretical, empirical and computational approaches, the Metascience Institute would assess existing and proposed policies and practices in the research ecosystem and engage in public discourse around them, including by assessing the relative costs, benefits and side effects of alternative parametrizations of the system. The project proposed here is to design the organizational structure of such a Metascience Institute in an evidence-based and community-led fashion, to seed it with organizational values, to establish it as an independent legal entity with open and transparent policies and practices, to provide it with an initial technical infrastructure online, to design evidence-based and sustainable mechanisms by which it prioritizes its activities, and to document the entire process in a way that would facilitate reuse and adaptation by other communities or entities aiming at evidence-based systemic improvements to the research ecosystem or selected niches within it.

Keywords

research system, research funding, systems engineering, metascience, organizational change, societal benefit

Problem description and proposed solution

This Pioneer project aims to address the problem that the (German) research ecosystem has a lack of public data on how its current characteristics compare to potential alternatives in terms of maximizing societal benefit. These characteristics affect considerable parts of the research ecosystem in Germany and beyond and include - but are not limited to – the funding of long-term tasks via short-term mechanisms, perverse incentives, the use of the concept of excellence and overreliance on narrow metrics and limited dimensions of research impact in research evaluation, the overemphasis on patents in technology transfer, the underemphasis of collaboration relative to competition in research funding contexts, the lack of attention on reusability of research, the difficulty of balancing research work with private life, the very low availability of long-term positions for postdoctoral researchers, and a lack of transparency throughout the system.

The proposed way to address the problem is the establishment of an independent research organization with the mission to improve the research landscape systemically, with an initial focus on Germany and the intention to broaden it over time. The core idea here is to turn the scientific method onto itself and to design social mechanisms to enable that organization and the communities around it to use scientific methods to assess, rethink, refine, reimplement, replace or otherwise reimagine key elements of that landscape.

To facilitate that, the organization is expected to be legally independent from existing research organizations, giving it the freedom to pursue its mission in a community-driven and value-guided manner. Once established, the new organization would catalog shortcomings of the existing research ecosystem (initially in Germany, and increasingly also beyond), assess potential solutions, prioritize them by their transformative potential and test their practicality in pilot implementations involving relevant stakeholders. To maximize the societal benefits of its activities, it would default to working in a transparent and participatory fashion. The majority of its activities would be taking place online and remotely, though with options to integrate non-virtual elements of research workflows. This approach would allow the institute to work in an open-science fashion by default, while still enabling it to collaborate extensively with existing research organizations and other partners - initially in Germany or with close ties to Germany but over time also internationally.

The focus of the Pioneer project is on identifying and implementing a suitable configuration for such an organization. This will be done via the following main activities:

- establishment of mechanisms for community engagement and participation throughout the process of establishing the organization;
- detailed review (by way of online consultations and targeted in-person workshops) of the options for establishing such an independent organization in

terms of legal and organizational structure, governance model, financial and environmental sustainability, community health and other parameters;

- establishment of mechanisms for flagging issues in the German research system that affect more than one organization;
- establishment of mechanisms for assessing the merits of flagged issues and for prioritizing work on addressing them (taking into account parameters like feasibility and transformative potential);
- establishment of mechanisms for assessing proposed solutions or existing implementations for addressing a given issue;
- identification of relevant research questions highlighting evidence gaps pertaining to a given issue;
- running targeted research projects designed to address such evidence gaps;
- converting the insights gained from such research projects into reference implementations, policy recommendations or other actionable formats.

The result of the project would thus be an organization that is new in the German research landscape and independent of established research organizations, which is an undertaking for which no funding mechanisms are available at the federal or European level. That new structure would stimulate the generation and exploration of ideas about improvements of the research system as a whole as well as their systematic, transparent and community-driven assessment and eventual implementation. Its transparent setup would also provide mechanisms to strengthen metascience research in Germany and to broaden participation in it.

The project is to take place over the course of three years, with the first year focused on identifying the design parameters for the institute, the second year on its legal and technical establishment and the third year on finetuning its operations. Throughout the duration of the project, community-selected metascience research projects will be conducted to inform the process.

The personnel for the project will be chosen with an eye on a diversity of research-related organizational backgrounds, including organizational change. Complementary expertise will be leveraged via consulting and workshops.

The project will start out by using existing open infrastructures and services for community engagement and research communication, and additional open IT infrastructure and services will be added as the project proceeds.

Strategy for consolidation and scaling of your approach

The consolidation and scaling would have multiple dimensions, e.g. research scope, communication, infrastructure, community, or organizational complexity.

One way to fund the operations of the institute in the longer term would be via classical research funding streams. While few of these address metascience as such, the nature of the field allows to address many of its research questions based on case studies in more

established research fields that have dedicated funding lines. A promising setup here would be projects involving partners from two or more different disciplines to address metascience issues relevant to them.

However, these traditional funding lines cannot be the sole funding mechanism for the institute, as a dependence on such existing mechanisms might limit its potential to innovate. One way to both diversify the funding options and to scale the organization's operations would be to broaden its research scope beyond the German research ecosystem, e.g. to other countries or to other organizational scales of research ecosystems (e.g. sub-national units like federal states or municipalities, corporate or non-profit organizations, or communities). Another option would be to offer on-demand services on metascience or organizational change.

The transparent setup of the organization assists with engagement of stakeholders and might also provide fertile grounds for less common funding mechanisms, for instance based on certification (e.g. if research organizations comply with some standards recommendations pertaining to metascience), crowdfunding or participatory budgeting mechanisms.

Involved Partners/Institutions

To emphasize the independent nature of the institute, no formal partners are foreseen here.

However, the transparent process of establishing the institution invites participation from all interested stakeholders, and in addition, the line items for consulting and workshops will be used to leverage external expertise, e.g. on legal and organizational matters.

Budget

The total budget is EUR 500,000 over the course of three years. The main budget categories are outlined in Table 1.

Graphs (optional)

Picture any aspect of the research ecosystem under a microscope or magnifying glass (cf. Fig. 1a). Which aspects of it should we put our hands on to rewire (cf. Fig. 1b)? What is the evidence for or against such changes? The idea proposed here is to set up a Metascience Institute that can produce a steady stream of evidence to inform discussions about changes of the research landscape.

Funding program

Conflicts of interest

The authors have declared that no competing interests exist.
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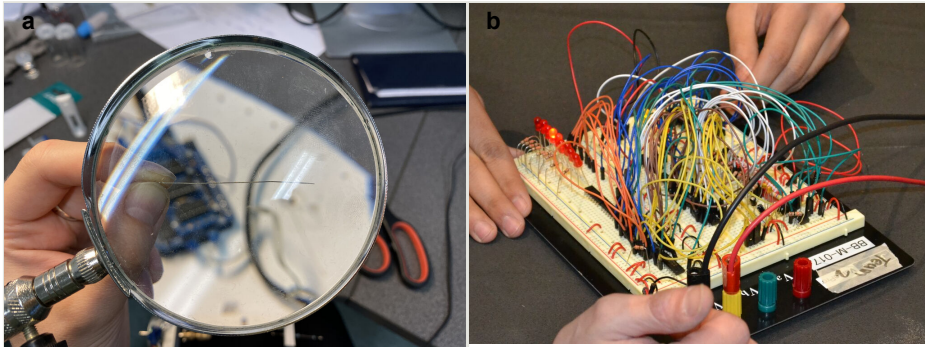
Figure 1.

The research ecosystem is complex, so optimizing it requires attention to both details and the broad picture, to people and hardware and anything in between, as well as to the overall social and natural environment in which research takes place.

a: Which aspects of the research ecosystem should be most closely examined? Image source: Kadri-Ann Valdur, Tarmo Tamm, Indrek Must, CC BY 4.0 .
b: Which aspects of the research ecosystem should perhaps be rewired? Image source: COD Newsroom; CC BY 2.0.

Table 1.

Budget outline

Category	Budget (EUR)
Personnel (3 x 0.5 E13 over 3 years, plus HiWi)	380000
Consulting	20000
Workshops	50000
Travel	4000
IT	30000
Publication costs	6000
Other	10000