Unlocking participation

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Impact paragraph

How to govern science, technology and innovation (STI) has been a central question for policy and society altogether, in particular in context of new and emerging technologies. Who is to have a say in STI development and governance and under which circumstances, is one of the core questions in STI (governance). It affects how we think about and act in innovation, and by extension, society altogether: our ideas about desirable futures are intrinsically interwoven with ideas of how to innovate - and to what end.

This is where this thesis steps in: Looking at *technical innovation*, new and emerging technologies promise new desirable ways to solve problems of our time. Yet, they pose considerable challenges for STI policy and governance. Due to their unknown consequences, the risk for public contestation is high – a delicate situation for STI governance. My thesis analyses and compares three emerging technologies – nanotechnology, synthetic biology, neuroenhancement -, all of which were expected to trigger extensive social debates at the time. Suspected to generate a need for (new and adapted ways of) governance, these technologies constituted a playing field to explore new governance concepts like R(R)I. Here, integrating society's perspectives has become crucial for shaping innovation, affecting every-day lives as well as the daily work of academics, researchers, and practitioners through practices of participation and societal engagement.

In particular, I am interested in phenomena of opening up and closing down in the context of governing emerging technologies, mostly, but not exclusively, in relation to participation and societal engagement. Reflection on unrestricted practices of 'openness' – in terms of participation and others – has increasingly entered the academic discourse. I contribute to this discussion by deconstructing current practices in the light of opening up and closing down, to help further the debate on appropriate, just, transparent and reasonable approaches to innovation, including participation and societal engagement and STI governance overall. Focusing on opening up and closing down allows to move the spotlight away from individualized approaches of participation and societal engagement towards the *structures* that enable or constrain agency in this regard. By so doing, I aim at highlighting the complexity in which participation and societal engagement are embedded, and the scope that guides individual endeavors.

My thesis aspires to make several contributions in both academic and practical work and its results are relevant for at least three main target audiences – academia, practitioners, and decision-makers in policy.

Scientific impact of my work

With regard to scientific contributions, my findings are foremost interesting for researchers interested in STI governance, specifically of either one of the technologies I outlined (neuroenhancement, synthetic biology, nanotechnologies). On a conceptual level, researchers interested in questions of social sciences, in particular STS, or technology assessment can benefit from my findings. Part of my contribution here is to advance and refine the approach of analysis of well-acknowledged phenomena – opening up and closing down in STI (governance). I do so by not only considering participation and societal engagement in dialogue, but in additional manifestations in relation to STI – as narratives and sociomaterial aspects (i.e., myths, affordances). Therefore, I actively span between different conceptions of discourse and strengthen attempts to expand conventional

understandings of dialogue - and by extension, the conditions that shape agency, i.e., opening up and closing down.

Moreover, I differentiate between different dimensions – the social, epistemic and normative – and made their convergence and divergence visible. By disentangling these three dimensions, I am able to delve deeper into the dynamics between opening up and closing down and to focus on their empirical rather than their normative quality. I argue that the social is widely discussed in literature and the epistemic is the most flexible among the dimensions. However, it is the normative dimension that dominates the dynamics between opening up and closing down. Consequently, focusing on the values involved in technology conflicts, rather than on epistemic aspects only, may help to disentangle lines of contestations. This is all the more interesting as the normative dimension cannot be closed down entirely. Consequently, STI governance of emerging technologies, including participation and societal engagement, *necessarily* remains open for re-negotiation. By following my approach in relation to three different emerging technologies, I provide new insights on the governance of emerging technologies and how agency becomes enabled or constrained in this context.

Practical insights of my thesis

Besides a scientific impact, my thesis also contributes to practical insight in the organization of participation and societal engagement. Here, practitioners and organizers of participatory processes, be it from research, innovation or policy, can benefit from my reflections to become better aware of potential pitfalls when conducting participation or societal engagement. For this, this thesis addresses challenges and unresolved aspects in relation to purpose and scope, timing and organizational form, actor roles, and framing, and provide practical remarks to support reflective practices of participation and societal engagement.

First, with regard to purpose and scope, organizers need to reflect on the proximity of the case to decision-making, affecting its flexibility in scope. This allows for expectation management without compromising its transparency and legitimacy. Second, timing and organizational form are closely intertwined, and again depend on the case study's proximity to decision-making, as well as its position along the innovation stream. To ensure a comprehensive reflection on STI, organizers and decision-makers need to appreciate and combine various forms of engagement, such as invited and uninvited engagements. Third, the construction of actor roles reproduces wider understandings of how the social and technical realm relate to each other. Practices of participation and societal engagement need to reflect more comprehensively on the implications of this situatedness to better integrate considerations of innovation and responsibility, and deriving impacts of opening up and closing down. Fourth, reframing issues allows for opening up, yet, is frequently restricted by the proximity to decision-making. Inducing different framings simultaneously supports opening up of STI (governance) in a fragmented way and still allows for closure where needed.

My thesis aims at supporting reflection on the structures that enable and constrain agency and to move towards systematic perspectives on participation and societal engagement. Policy decision-makers benefit from these reflections in planning governance processes: here, being more mindful with regard to trade-offs between opening up and closing down is crucial when it comes to designing and implementing (STI) governance

and participatory processes. In particular, reflection on the open-endedness of processes and on how to frame activities to mobilize specific publics, could still be strengthened in practice. Accordingly, how we conceptualize issues will affect how wider society is able to contribute to STI governance.

Dissemination and outreach of my results

To engage with the scholarly community, I have published two co-authored articles in peer-reviewed journals, one more article is to be submitted soon. Also, I have co-authored five more articles that closely relate to the case studies of my thesis (see below). The results of the projects that my thesis is based on, have been published online as project deliverables (see respective websites). In addition, I am co-editor of a special issue of the Journal of Responsible Innovation ("Into the wild: Futures and Responsibilities in Technology Assessment", Volume 4, Issue 2, 2017 pages 83-315), where one of my case studies was published. To present the special issue, I organized two sessions for the authors at the S.Net 2017 at Arizona State University/USA. Moreover, during the five years of my research, I co-organized national conferences (e.g., the annual conference of ITA) and sessions at national and international conferences (e.g., STS Graz 2020/21, 4th European TA conference 2019 in Bratislava/Slovakia, 3rd European TA conference 2017 in Cork/Ireland), and had the chance to attend a few more (including EASST 2022 in Madrid/Spain, EASST4S 2020 in Prague/Czech Republic, NTA8 2018 Karlsruhe/Germany, SNet 2018 Maastricht/Netherlands, SNet 2016 Bergen/Norway, EASST4S 2016 Barcelona/Spain[34]).

My main effort to reach out beyond the scholarly community was to publish numerous communication briefs (EU policy briefs, ITA dossiers, NanoTrust dossiers) about the projects that I was involved in (and thus on my thesis in a wider sense). These briefs addressed politics (Members of Parliament), policy and authorities, as well as a more general public. Through these efforts, I hope to initiate widespread scholarly, policy, and public debates not only on participation and societal engagement, but on how to govern emerging technologies more broadly.

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[34] Technically, the last two took place before the official start of my PhD, but were already related to the projects that my thesis is based on. Therefore, I listed them as well.