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Exploring Frictions of Participatory Innovation between Sites and Scales

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Introduction

In June 2015, before an audience of policy-makers and innovators in Brussels, European Commissioner Carlos Moedas maintained that it was imperative to involve many more actors in innovation processes – from researchers to entrepreneurs, users, governments and civil society. This *leitmotiv* was even turned into a strategic priority of its mandate, which he believed was justified by the evolution of research and innovation practices worldwide:

We are entering a world of open, user-driven innovation. A world in which the digital and the physical converge. A world in which knowledge is created through global collaborations involving thousands of people from around the world and from all walks of life (Moedas, 2015).

At the end of his speech, Moedas concluded lyrically, by urging the public authorities to rise to the challenge:

We must ensure that each of our actions introduces new participants, young researchers, dynamic entrepreneurs, and people who have never been involved in European research and innovation ... When innovators like LEGO start to merge real pieces with digital magic, when citizens carry out their own research and development through EU online projects, when doctors start to print living tissue for their patients ... Public authorities must do the same (Moedas, 2015).

This speech was not meant to be limited to the audience of a conference room in Brussels. What Carlos Moedas presented that day was the demonstration of a much broader political act, which outlined a central piece of the European Commission's strategy for research and innovation. This approach should not be viewed as an isolated case limited to the European scale. All over the world, through the involvement of a wide range of publics, innovation is increasingly presented as a participatory process to which everyone can and should contribute (Delvenne and Macq 2020; Macq et al. 2020).

The phenomenon refers to ‘co-creation’, i.e. the collective creation of (more) value by fostering collaborations between firms, designers and users in order to produce marketable products more directly aligned to users’ expectations (Pralhad and Ramaswamy 2004; Payne et al. 2008), but it is much broader than that. From Denmark to Chile to the Netherlands, the articles in this special section show that participatory innovation practices are increasingly endorsed by public authorities as means for (re)developing their economies and/or energy systems (Pallesen and Jacobsen 2021), (re)configuring their relationships with citizens (Spronck et al. 2021), or (re)shaping the way they govern (Tironi and Valderama 2021).

The Need for a Critical Analysis of Participatory Innovation

A critical analysis of this growing phenomenon is therefore essential and this is precisely what underlies the ambition of this special section. In recent years, social science debates have witnessed a noticeable increase in the use of the vocabulary of experiments outside of scientific settings, to include a range of social and political experiments that feature prominently in our daily lives. Sociologists have employed terms such as ‘society as a lab’ and ‘real-life experiments’ to describe practices of knowledge production formerly taking place in the confined settings of a laboratory, but now expanding to encompass the whole of society (Gross and Krohn 2005; Krohn and Weyer 1994). Likewise, beyond classical descriptions of scientific experiments and laboratories, authors working in the field Science and Technology Studies (STS) have used the vocabulary of experiments to account for changes in democratic orders (Felt and Fochler 2010; Laurent 2016) and public participation (Bogner 2012; Lezaun et al. 2016; Voss and Amelung, 2016).

However, STS scholarship on participatory innovation has only recently focused on ‘real-world experiments’. This theoretical concept came from analysing technoscientific innovation: in such an experiment, a technology, innovation or method passes from laboratory-controlled conditions for testing in real-life settings. What counts as ‘real-life’ can be ambiguous or contested (Levidow and Carr 2007; Gross 2016; Engels et al., 2019; Parotte 2020). Much remains to be done to understand how innovation is made available for experimentation, and what experimenting in real-world settings means.

In this special section, the analytical concept helps to understand links between ‘participation’ and ‘innovation’, mutually shaped through a testing process. Two articles (Pallesen and Jacobsen 2021; Tironi and Valderama 2021) draw on the concept of real-world experiment. They indicate that participation aims at simulating and/or testing a potential future, which can constitute an ‘innovation’ in the double sense of the term.

All three articles engage with a wide range of questions, such as: Why and how has participatory innovation gained such traction in different contexts?

What forms of knowledge and power emerge through participatory innovation? How do users and participants engage within participatory innovation processes? How do competing visions of participatory innovation interact with each other? How does participatory innovation contribute to shape new ways of governing? To tackle these questions, the articles here suggest two interesting analytical entry points that should be systematically considered. They open the way to a research agenda that we will detail after the general presentation of each paper.

First, the articles develop a rich analysis of the multiple relations between innovation and the places where it is conceived and practiced. To do so, they analyse the multiple entanglements between the different sites and scales at play in participatory innovation. More than merely identifying the situatedness of participatory innovation, the articles highlight how its initiators, participants and the mobilized instruments interact at the same time with different environmental and material components (i.e. sensor devices, colour hats, video screen) that are an integral part of ongoing experiments (Marres 2012).

Second, and related to the first point, these entanglements between sites and scales as well as the divergent motivations and visions of the different actors in participatory innovation inevitably create ‘frictions’ that deserve special attention, which allows us as guest editors and the contributors to this special section to offer sharpened conceptual tools to analyse participatory innovations.

If sites, scales, and frictions matter, it is because participatory innovation discourses and practices today circulate across geographical regions and technical domains, forming an emerging ‘technological zone’: ‘a space within which differences between technical practices, procedures and forms have been reduced, or common standards have been established’ (Barry 2006: 239, see also Bogner 2012; Voss and Amelung 2016). A key aspect of this standardization relates to the testing of technologies in so-called ‘real-world setting’: ‘[the latter] is an important qualification of the knowledge claims produced [...], because it proves viability *via-à-vis* competing solutions and promises of ‘scaling up’ the solution’ (Pallesen and Jacobsen 2021).

As Engels et al. (2019) point out, ‘scalability’ is a central feature of participatory innovation, which also generates tensions because it needs to be balanced with the need for a specific solution at the local level: ‘Underlying the ambition of scalability is the assumption that the experience gathered in a unique local setting can be turned into generalizable, quasi-universal solutions that would maintain their validity when removed from their original conditions of production’ (Engels et al. 2019, p. 9). In order to maximize the potential societal benefits that may come out of participatory innovation, they stress that a key question is how developers envision scalability and what should be transferred. This approach challenges participatory innovation promoters to explore whether ‘the local conditions and practices of genesis are sufficiently understood to be packaged into standardized and transferable products’ (*Ibid.*).

The articles in this special section show that the universal promise of scalability is always at risk of disappointment. For instance, Pallesen and Jacobsen (2021) analyse the many tasks performed by the local technicians concerned with keeping participants happy and onboard the experiment, which can in many ways undermine the scalability of the knowledge produced in the experiment. Similarly, in the article by Tironi and Valderama (2021), the multiple domestic entanglements of users with sensors, such as their displacement or the short-circuiting of the USB power cable to charge a cell phone, are responsible for disconnections that affect the remote monitoring of variables that are supposed to speak for the environmental behaviours of homes in an entire region.

Furthermore, the articles point to *how* scales are performed at certain specific sites where frictional encounters between universals (i.e. scalability, standardization, controllability, replicability) and particulars (i.e. the specific socio-material arrangements in an unusual concert or in an intimate environment such as the home) take place. Indeed, they highlight how the site (and participants' multiple attachments to it) appears as a critical but often neglected dimension in the understanding and analysis of participatory innovations, which allows the object of the intervention, i.e. the flexible consumer (Pallesen and Jacobsen 2021), the artistic performance (Spronck et al. 2021), or the environmental behaviours of homes (Tironi and Valderama 2021), to emerge – often in contentious ways.

Papers in the Special Section

Pallesen and Jacobsen investigate the process of participatory innovation in developing a smart grid infrastructure that is supposed to enhance energy consumption in the Danish island of Bornholm. This real-world experiment, involving 800 private households, is analysed as a means to intervene on the so-called 'flexible electricity consumer', which adjusts their consumption to production rather than the other way around.

The authors focus on the island as it forms the boundaries of the experiment, all the while it is endowed with multiple politics by the scientists who run the experiment, the energy supplier and the local participants. They highlight how this site makes a flexible consumer possible as the object of the intervention, how it transforms the scientific knowledge production and how it frames the identity of the island.

Spronck, Peters and Van de Werff analyse participatory innovation practices in an under-explored and extremely coded domain: symphonic music. They examine how the organizers of a series of experimental symphonic concerts entitled *Empty Minds*, in the Netherlands, tried to innovate audience participation by inviting the audience to take up a new artistic responsibility: deciding upon the order of the music performed. Innovating the roles of audiences in

symphonic music appears particularly challenging given idiosyncratic normativities such as the silent listening of the audience.

In the case they investigate, Spronck et al. show that frictions emerged throughout the organizational process of *Empty minds* concerts. The hierarchical pattern of conventional symphonic concerts conflicted with implicit notions of an ‘ideal public’ and its desirable behaviour which shaped the plan for new audience participation. Contrary to what was expected, the traditional divisions of artistic labour were not changed, as audience members did not participate in new ways during the actual concerts. They conclude that what comes to count as desirable public participation is one of the main stakes in participatory innovation, and that it is necessary to design situations in which new roles, expertise, and divisions of labour and power can emerge, beyond what was initially planned.

Tironi and Valderrama analyse how smart sensors are deployed in different Chilean cities to generate data-driven decisions and smarter regulations on sustainable building. In their view, participatory innovations with digital devices are instances of a ‘sensor governmentality’: a mode of regulation of households’ behaviour at distance, thereby recomposing the relationship between the State and its population. However, the experiment shows contrasted results for data-driven government, in particular because planned engagement with users often clash with the actual entanglement among home inhabitants, sensors and their domestic contexts.

Frictions emerged between the pre-conceived roles and behaviours of inhabitants and sensors, and the ways in which these roles and behaviours unfolds in practice. It turns out the supposed success of these participatory innovations would be to control the environment and the inhabitants’ participation in order to ensure the most ‘natural’ behaviour. They conclude by stressing that what is ‘real’ in these real-world experiments is inherently dependent on the multiple lively realities’ behaviour, which remained hardly controllable.

A Research Agenda for Participatory Innovation in STS

Frictions in Participatory Innovation

In each article of this special section, ‘frictions’ are repeatedly identified concerning the rationales of participation as well as the (un)expected behaviour of the participants. The notion is mobilized somehow indirectly (Pallesen and Jacobsen 2021 highlight ‘conflicting demonstrations’), but also more directly by taking ‘frictions’ as ‘the hidden or implicit tensions that are often part of participatory practices’ (Spronck et al. 2021), or as tensions that become manifest in divergent ‘scripts’ of participatory innovation (Tironi and Valderama 2021).

As guest editors, we want to take advantage of this polyphonic deployment of the term to go beyond the consideration that friction is something that needs to be identified or repaired, and advocate for the generativity of this term as emerging from the specifics of participatory innovations. Taken together, these three contributions allow us to go one step further and address the notion of 'friction' more seriously in STS in order to problematize what is happening at the sites of participatory innovation, and how conflicting engagements with(in) the site relates to different scale-making projects.

As an analytical term from a physics metaphor, 'frictions' implies that actors' aims diverge at a social interface where they meet. Through her ethnographic work on environmental politics in the Indonesian rainforest, Tsing (2005) develops this notion as a counterpoint to stories of transnational flows of goods, ideas, people and money. She contends that the most powerful universals of global history, such as capitalism, science, or politics, are only effective within practical historical conjunctures that give them content and force. She addresses this conjunctural feature of universals in practice by speaking of 'engagement'. A friction, which she describes as 'the awkward, unequal, unstable, and creative qualities of interconnection across difference' (Tsing 2005: 4), is the practical engagement through which different scales form each other and seemingly universal solutions gain traction.

In this sense, participatory innovation projects that can lead us to imagine and experience locality, such as a Danish Island or a concert hall in a refurbished industrial building in the South of the Netherlands, or the wider space of regions and nations, such as Valparaiso or the country of Chile, are scale-making projects. The scales are not given but rather emerge 'through the contingent articulations into which they are pushed or stumble' (Tsing 2005: 57). Analysing frictions in participatory innovations thus implies an emphasis of how connections get made between and within different sites and how they operate, without naturalizing the scales of the experimental intervention. A friction-based perspective thus emphasizes the encounter of long-distance connections and locally specific differences, highlighting how situated particulars and universals relate in specific times and places.

STS research on participatory innovation has so far provided an in-depth analysis of their production and reception, often in the language of co-production (Jasanoff 2004). On the production side, participatory innovation has been analyzed by focusing on the interrelationships between participatory procedures, the publics involved, the issues that are the object of participation, and the objectives of participation (Felt and Fochler 2010; Chilvers and Longhurst 2016, Delvenne and Macq 2020). Synthetizing this approach, Chilvers and Longhurst (2016) argue that all forms of participation are emergent phenomena and social experiments in themselves. On the reception side, Pfothenauer and Jasanoff (2017: 801) treat innovation as 'a locally constructed concept' and they argue that innovation models, participatory or otherwise, 'are not sets of

practices that travel unchanged across social, cultural, and jurisdictional boundaries’.

Rather, they are responses to local imaginaries that reflect countries’ prior conceptions of, and justifications for, the need for innovation’ (Pfothenauer and Jasanoff 2017: 801). In these STS contributions, ways of knowing and configurations of power may oscillate between different ordering scales, but the making of these scales is not explored extensively (Aarden and Delvenne, in preparation). The concept of friction can enrich existing STS perspectives by considering the situated contingencies of participatory innovation and providing a language to explore the making of scales through real-world experiments.

In the EcoGrid experiment examined by Pallesen and Jacobsen (2021), making the local energy infrastructure a test zone for green energy technologies is a scale-making project, which opens a window into Bornholm’s larger competition against other Danish regions to become recognized as a site for future green energy technology solutions. To local participants, however, the scale often matches the borders of the island: the experiment is above all a demonstration of their commitment to the island as a community faced with a future depopulation of the island as a general risk for the periphery of the country.

Tironi and Valderama (2021) analyze the selection of cities and final participants to the ReNaM experiment, which were based on socio-economic criteria and geographic and climatic zones of interest. Yet, for the Ministry of Housing and Urban Development, including different regions into the experiment is not only a prerequisite to a potential scaling up of the project. Making the regional scale visible in the construction of a national housing monitoring network is also a suitable way to reduce the widespread impression of Chile being a highly centralized country. For many participants in the experiment, however, the regional scale has a different meaning: engaging with ReNaM is a way of making their lived reality visible to the State.

In Spronck et al. (2021), the *Empty Minds* concerts are expected to give new artistic responsibilities to the participating audiences on the micro-scale of a symphony orchestra’s artistic performance. At the same time, for the organizers the ‘i-Classics series’ foreshadows the possible development of this type of performance on a larger scale, with the aim of reinventing the symphony concert to cope with budget cuts and the growing scarcity of spectators. Through these orchestra experiments, one can glimpse the shadow of the policies applied at the national scale, according to which musical organizations are only legitimate recipients of public funding if they face changes in the composition, preferences and behaviour of their audiences.

A friction-based perspective on participatory innovation must also be open ‘to experimentation with different types of normativity through which the social scientist accounts for her commitments and shifts or deepens her

engagements in response to conflicting demands and real-world circumstances' (van Oudheusden and Laurent 2013, 3). Downey and Zuiderent-Jerak (2017: 240) consider that 'experiments in participation involve STS scholars deeply with both the existing frictions they identify and the new frictions they produce'. In their understanding of the term, 'frictions' are reduced to 'localized complexities in technoscientific practices' and they refer to them opportunistically as way of 'using [our own] involvement to problematize our own intentions and actions'.

Caring in and About Participatory Innovation

The three articles presented in this special section go beyond studying the possible interest of 'frictions' in fostering greater reflexivity and more acute knowledge production. Instead, they pave the way for the exploration of the practical doings of frictions in participatory innovation. In particular, they challenge us to consider how frictions can also play a role in fostering caring relations in, and about, participatory innovations.

The practice of caring involves a notion of doing and intervening, and it needs to be envisioned an ethico-political issue (Puig de la Bellacasa 2011, 89). In this sense, the articles offer an interesting basis for a three-pronged research agenda that takes friction as an empirically and methodologically-driven notion. Taken in that way, the notion of friction equips us with the capacity to explore the careful (re-)makings of sites and scales of participatory innovations.

First, frictions may trigger, or just exhibit, the caring relations in participatory innovations, or lack thereof. The three articles highlight that care is an affectively charged connotation that reflects a strong sense of attachment and commitment to something (i.e. the participants feel committed to the future of the island of Bornholm, to the routines of classical music, or to the statistics of the Chilean state).

Second, frictions are useful to expose forms of exclusion and relations of domination in participatory innovations. Caring is about repair and maintenance (i.e. maintaining a high and stable number of participants, restoring the traditional set up of a concert hall, or reconnecting smart sensors so that they can transmit data again), a form of labour that the three articles show is often devalued and/or made invisible. But the point is not only to expose or reveal invisible labours of care, but also to generate care, especially when forms of domination of a sociotechnical assemblage leads to worrisome exclusions (i.e. searching for user erasure to let the technology work with as little human interference as possible, unconsciously resisting giving any new meaningful artistic responsibility to the audience of a classical music concert, or not taking domestic interactivity between sensors, data and inhabitants into account).

Third, friction can be the cornerstone of intellectual and political work on participatory innovation. This means that, as scholars, we need to be able to show our attachments to certain perspectives, like the civic values of democratizing innovation through enhanced participation (an ideal from which participatory innovation seems to be moving away, cf. Delvenne and Macq 2020), in order to critically and meaningfully engage in the becoming of participatory innovation. The latter seems to us to be a necessary task mainly because it may enable us to *change* our attachments to certain perspectives. It might enable social scientists to experience and be forced to deal with frictions themselves.

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