Ulrike Felt

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Address for correspondence:

Ulrike Felt
Department of Science and Technology Studies
University of Vienna
Universitätsstrasse 7/II/6 (NIG)
A-1010 Vienna, Austria
T: ++43 1 4277 49611
E-Mail: ulrike.felt@univie.ac.at
http://sts.univie.ac.at

The temporal choreographies of participation:

Thinking innovation and society from a time-sensitive perspective

Ulrike Felt

Time is an essential feature of social life that not only enables us to structure and order our worlds but also to create and sustain the feeling of stability and belonging. However, even though time is deeply entangled with questions of control and power, it tends to be all-too-easily naturalized and to remain unquestioned. The goal of this chapter is to bring time to the forefront of debates on public participation. Following the general line of questions spelled out in the introduction to this book, this analysis will explore the temporal textures and choreographies (i.e., the entanglements of different temporalities), pointing at how time structures, molds and guides any engagement with science and technology. Building on extensive fieldwork on public participation conducted over the past decade in Austria, time will be addressed through four perspectives: clock time, trajectorism, emplacement of time as well as multiplicities and inconsistencies of time. The conclusion will address the time-related ontological politics at work, the need for a more care-oriented approach to participatory exercises, the ways in which temporal choreographies frame responsibility and finally, the interrelatedness of time and citizenship (and thus of democracy).

Introduction

Time is an essential feature of social life that not only enables us to structure and order our worlds but also to create and sustain the feeling of stability and belonging (e.g. Edensor, 2006). Memory, anticipation, rituals, rhythms and tempo are but a few of the many ways in which time materializes. (Adam, 1998, p. 202) However, even though time is deeply entangled with questions of control and power, it tends to be all-too-easily naturalized and turned into the "deep structure of taken-for-granted, unquestioned assumptions" (Adam, 2003, p. 60). This definitely holds true with respect to per-

forming and analyzing public engagement with technoscientific issues. The goal of this chapter is thus to bring time to the forefront of debates on participation. Following the general line of questions spelled out in the introduction to this book, the analysis will explore the multiple invisible temporal textures as well as the temporal choreographies (i.e., the entanglements of different temporalities) of participatory practices, pointing at how time structures, molds and guides any engagement with science and technology. In doing so, temporality is addressed on two interconnected levels: investigating (1) temporal structures of participatory exercises as such, thereby reflecting on the role that time plays in how people (can) gather around a public issue related to technoscientific developments; and (2) the temporalities embedded in contexts, objects or matters of concern (Latour, 2005) that are identified and addressed in such participatory exercises.

At the cross-roads of innovation and participation discourses

In grappling with the intricate ways in which time and participation are interwoven, we find ourselves amidst two simultaneous developments. On the one hand, we observe the rising importance attributed to innovation in the development of contemporary societies, manifested in discourses on speed, pressure and promising directions to follow. On the other hand, we witness the emergence of policy discourses stressing the need to be more inclusive towards society when it comes to making technoscientific choices. The headline "Europe in a changing world—Inclusive, innovative and reflective societies"[1] that can be found on the Horizon 2020 webpage is but one of many examples marking the proliferating discourses on the entanglement between innovation and public engagement in the European Union.

Indeed, in European policy discourse, innovation is promoted more vigorously than ever "as a way out of crisis and as a foundation for future prosperity" (Felt et al., 2013, p. 3). Europe's future is perceived as depending on its power to innovate combined with its capacity to create an innovation-friendly climate (EC, 2013). Citizens are constantly reminded of the competitive pressure faced by Europe in the global race to innovate, and the speed of delivering innovations has become a major concern for policy makers. A growth-focused mindset has gained significant ground, with policies fostering specific, strategically selected innovation trajectories. 'Act now, before it's too late' has become a key-slogan when imagining and performing European futures. The core of the European innovation narrative thus gravitates towards issues of tempo and timing, roadmaps, milestones and trajectories, windows of opportunity and futures to be enabled. A powerful European sociotechnical future is envisioned that will depend on both an ever-increasing flow of technoscientific innovations and a 'European public' supporting them (Felt, 2010). This vision fits well with the broader diagnoses that we live in a time characterized by a "breathless futurology" (Harrington et al., 2006) embedded in an "economy of technoscientific promises" (Felt et al., 2007); a time when "standing still means falling behind", when "acceleration becomes an economic imperative" (Adam and Groves, 2007), and when multiple "anticipatory regimes" (Adams et al., 2009) are put in place to assure the realization of the not-yet. In these debates on remaking Europe through innovation, we perceive a multitude of temporal orders at work that appear to be largely taken for granted.

Simultaneously, bringing societal actors on board to support this innovation-driven European future becomes a core concern (Irwin, 2006). The reference to the creation of *inclusive and reflective societies* in the above-mentioned headline is meant to capture this preoccupation. A number of highly visible public controversies around technoscientific issues have sparked debates on the limits of classical forms of democracy and have triggered efforts to open new spaces to better accommodate the values and visions of broader sets of societal actors. Public participation has thus come to be perceived as an essential remedy against an allegedly missing public trust in science and technology (Wynne, 2006) and against an insufficiently sustained innovation-friendly climate (Felt et al., 2007). A flurry of participatory activities varying in format, intensity and goal have been designed, tested and assessed, ranging from public consultation exercises and debates over citizen panels and consensus conferences to longer-term engagements between researchers and specific publics, as is the case for some patients' associations or civil society organizations. The notion of the "participatory or deliberative turn" attempts to capture this mood of addressing new and potentially contested technoscientific developments in a more inclusive manner, thereby reinvigorating public debate and creating space for a more active citizenship.

However, this enthusiasm to 'democratize democracy' has been tempered by analysts pointing out the limitations and pitfalls in the execution of participatory ideals. Critics, among others, underline that participatory exercises have often (re)performed the classical deficit model of science and technology communication under a new guise (Wilsdon et al., 2005). They highlight the frequently quite narrow problem framings that do not allow to address broader societal issues in the deliberation process (Irwin, 2006, Stirling, 2008). Analysts reflect how well-delimited sets of publics are created through these (often experimental) exercises, while others are marginalized or silenced (Wynne, 2007, Braun and Schultz, 2009, Felt and Fochler, 2010). When comparing national contexts or different formats of participation within any single context, authors underline the need to more carefully consider the situatedness of such exercises and the difficulty of their standardization in the form of best practices. The latter would carry the risk of reducing participation to an exercise done "by the book" and of developing a quasi-ritual character (Felt et al., 2013), thus pre-empting its creative potential. Others again point at the problem that the consensus-oriented nature of participation can limit the space for dissenting opinions (Horst and Irwin, 2009) and thus silence potentially valuable minority positions.

Beyond repair work: It's time for a time-sensitive perspective

While these critical analyses emphasis the range of specific weaknesses of participatory exercises and trigger "repair work" through redesigning participatory formats and developing new ones, less attention has been paid to more pervasive, often tacit structural features such as the prevailing temporal orders. In addressing these latter aspects, this chapter will ask how participatory practices are shaped by the ways in which time is scripted in innovation as well as how temporalities matter in the formation of publics, in the framing of issues, in the ways responsibility gets addressed and in multiple other aspects.

Time has previously been a concern in this context. Debates centering around upstream/downstream participation (Wilsdon et al., 2005) and thus around the best moment in an imagined and imaginary innovation trajectory when engagement should take place are one way of addressing time. Societal voices should be heard at a moment when the "future direction of technological development is not yet established; the social and ethical impacts of [innovations] are uncertain; and public attitudes […] are not yet fixed" (Doubleday, 2007, p. 60). Situating participation too far downstream was seen as leading to framing the issues at stake mainly in terms of the potential risks of applications while failing to address broader issues of societal choices. Other approaches have investigated the "temporal coding within developmental discourses" that attend to emerging technological domains, showing how these "are caught and constrained by ideas about expectations, good timing and opportune times" (Selin, 2006, p. 122). There is also an extensive body of literature on projection work, futuring, and expectations with respect to new technologies (e.g., Brown et al., 2000, Brown and Michael, 2003). Furthermore, we can point at research converging around the notion of "anticipatory governance" (Barben et al., 2008),, being concerned with the "rise of assessment regimes" (Kaiser et al., 2010) more broadly speaking or discussing the nature of "foresight knowledge" (von Schomberg et al., 2005). What connects all these latter approaches is the attempt to develop anticipatory and more adaptive forms of governance as well as to connect public participation explicitly with the realm of making technoscientific futures. However, while these approaches triggered a reconsideration of participation, they neither led to a cross-cutting investigation of how these different temporalities frame participatory processes involving technoscientific issues nor to a systematic reflection regarding the combined effects of different temporal dimensions on technoscientific developments, democracy, citizenship and participation.

In performing such an in-depth time-sensitive analysis of participatory exercises, it will be essential to attend to the multiple (often tacit) temporal practices and imaginaries of organizers, participants and societal actors alike. Such an approach enables us to carefully reconsider how "time horizons and time structures are constitutive for action orientation and self-relations" as well as how "temporal structures form the central site for the coordination and integration of individual life plans and 'systematic' requirements" (Rosa, 2013, p. 5). Studying participation through the lens of temporalities will thus enable us to move beyond the macro/micro divide as well as beyond a choice in focus between structure and individual practices and to direct our attention to interaction between different scales.

The following analysis is inspired by Barbara Adam's (1998) concept of timescapes, which highlights the intertwined character of physical time, cultural time and more personal perceptions of time. Investigating the dynamic nature of timescapes, and not time as such, means taking a broader perspective, addressing complexities, giving space not only to physical notions of time but also being sensitive to the multiple, deeply culturally rooted time-related practices of recalling, projecting, anticipating, experiencing and imagining technoscientific and societal developments. Uncovering the co-presence and interplay of heterogeneous forms of time will allow us to examine limitations and frictions that occur and identify how they shape the participatory potential of any setting.

The observations and arguments presented in this chapter are based on extensive fieldwork conducted over the past decade. The material covers transcripts and field notes from a broad range of public engagement exercises with technoscientific issues primarily in the Austrian context, the majority of which have been conducted by the author and her colleagues.[2] These events range from a large number of focus groups, to specifically designed, card-based discussion workshops, to long-term round-table discussions bringing citizens and scientists together, to a citizen conference, to open debate methods called "discourse days." The topics covered were related to different aspects of nanotechnology, the life sciences, biomedicine and health. To contextualize these participatory events and to grasp their temporal framing, policy documents were studied. These two sets of data form the basis for an in-depth reflection on the temporalities present in different formats of engagement, how different times are entangled with each other and how they shape participation. Time will be addressed through four perspectives: clock time, trajectorism, emplacement of time as well as multiplicities and inconsistencies of time. The conclusion will then highlight the time-related ontological politics at work, the need for more care-oriented approaches to open up possibilities for and within participatory exercises, the ways in which temporal choreographies frame responsibility and finally, the interrelatedness of time and citizenship (and thus of democracy).

Clock time and the illusion of control and order

The first temporal perspective is centered on the theme of clock time as a major ordering force in contemporary societies. Physical time appears to provide "the external framework within which actions are planned and executed. It is a time that operates independent of human actions, an objective parameter that allows us to locate actions in a temporal grid and consider questions of timing and speed" (Adam, 1998, p. 32). When approached from this angle, clock time has, as Adam (2003, p. 63) convincingly argues, become "decontextualized, […] invariant, quantifiable and external." It is a powerful filter "through which reality is sieved and [a] lens through which all social relations and structures are refracted" (p. 64). In addition, it "obscure[s] other forms of time, banishing them as unproductive and irrational" (Hassan, 2009, p. 41).

Social theorists and science, technology and society (STS) scholars alike (e.g., Elias, 1988, Latour, 1993) call for an awareness that clocks should not be perceived straightforwardly as instruments that measure time independently of humans and our actions. Instead, clock-time is itself an instrument intended to provide orientation and regulation in our lives and to order actions. Thus, we are confronted with "the solid facticity of time" while knowing about its social nature (Rosa, 2013, p. 5): clock-time is man-made as much as any other temporal structure under which we live. At the same time, as Manuel Castells (2010) has clearly noted, the power of clock-time as a physical entity is omnipresent: it invites us to believe that we can squeeze an ever-increasing amount of activity into the same time unit. Or, to say it in Jeremy Rifkin's (1987, pp. 3-4) terms, "the idea of saving and compressing time has been stamped into the psyche of Western civilization and now much of the world." This perspective supports the predominant mindset of efficiency, which is highly valued in contemporary industrialized societies as a clear marker of successful, competitive behavior. Consequently, specific modes of ordering society as well as regimes of monitoring and control are introduced

to support and stabilize this ideal. With respect to conceptualizing technoscientific innovations, embracing a physical understanding of time also enables thinking in terms of an acceleration of flows to produce more innovations in ever-shorter amounts of time. The powerful figure of the global race thus perfectly fits with such a framing of time.

In participatory exercises, clock-time becomes apparent in multiple ways. To begin, what is regarded as an adequate duration and temporal structure of participatory events obviously impacts the possible ways in which matters of concern take form and are debated. This perception shapes what types of scenarios are elaborated and tested and whether and how the right to take time for deliberation can be exercised. This facet became clear when comparing discussions from a round-table event on genome research that lasted seven full days over a period of nine months with one-time, two-hour focus groups on similar topics. People participating in the latter generally tended to take less ownership over how an issue was exactly framed, were more pragmatic in their positioning work and showed a higher readiness to be guided by a prescribed format. Participants in the long-term engagement exercise particularly stressed the importance of disposing over enough time to speak not only about research itself but also to explore how one could make sense of that research more broadly speaking.

In this context, time is framed as an essential resource. In interviews made with participants in a long-term discussion events reflecting on their experiences, they pondered the issue of "time scarcity" hindering (their) engagement and the fact that any capacity to participate depends on the power and control one has over one's own time (Nowotny, 1994). They further stressed that it was "the time to really speak to scientists at length" that was essential for the quality of the engagement. In this vein, participants sometimes also speak of "donating" their leisure time[3] to engagements that serve the greater social good, framing this act as their contribution to society's necessary concern for how technoscientific and societal development relate. Yet, "the proper amount of time" that was necessary to adequately address complex issues always remained undecided (Flaherty, 2010), and thus, which temporal structure would make any participatory event sufficiently robust to withstand public scrutiny also remained open.

While taking time to carefully explore the technoscientific issues at stake mostly holds a positive connotation for participants, policy makers and also scientists, in part, framed this as (irresponsible) temporal luxury in situations of pressing public choices: taking time could potentially hinder scientific developments and endanger the country's/Europe's place in the innovation race. A broad opening-up of the issues at stake or deviations from what is regarded as the core topic thus run the danger of being classified, even by some of the participants, as "losing time" (Callon et al., 2009). In a context of tight schedules and the feeling of external pressure to act immediately, the idea of participation can thus also be constructed as a "waste of time" because policy decisions will have to be made long before any decent assessment can be rendered.

Temporality of participation is also essential with respect to asking whether and how participants constitute themselves as a collective or whether they prefer the role of affected individuals, citizens or consumers. The shorter the time frame of any engagement exercise, the less people can conceive of their potential capacity to form a

thought collective, to develop a group identity or to experiment with different modes of valuing issues at stake. This in turn impacts how issues can be constructed and addressed. Thus, time to make an issue and time to become a specific collective (or to form a public) must be perceived as closely intertwined. This observation is in line with Noortje Marres' (2005) argument on the entanglement of issues and publics, underlining that publics are not simply "sparked into being" but instead are always coproduced with issues – and both are related to the temporalities at work.

Finally, clock time is also omnipresent when people reflect on the pace of technoscientific developments and how this impacts their participatory capacity. Technoscientific developments are generally described as extremely rapid, with a tendency "to overwhelm all of us," as one participant would express it. Accordingly, researchers and industrial players were often pictured as "quick and versatile" and ready to "jump on any opportunity" offered by technoscientific advances, whereas regulators, policy makers and publics were perceived as inherently slower, as lagging behind. These differences in pace made it difficult for participants to clearly identify where, when and how they could intervene in technoscientific developments, which in turn triggered reflections on how one could adequately address issues of responsibility. In addition, these reflections nourished the perception of policy makers not being able to adequately respond to these rapid developments and promissory pressures of progress (e.g., Beynon-Jones and Brown, 2011).

In this context, and embracing the broader policy narrative of competition and speed, participants would also explicitly ponder the fact that, whereas Austria could refrain from embracing certain technoscientific developments, "the Germans or the Swiss, or I don't know who … would do it." In the end, one participant would explain, "if we are faster, we do it [laughter], it's our chance" and this would at least be profitable. This attitude clearly shows the tacit assumption of the unavoidability of knowledge-related developments and points to the limitations of any participatory exercise in a globalized knowledge society.

Participation and the ambivalent love for trajectorism

An omnipresent trajectorial narrative of sociotechnical developments is the second temporal perspective to be investigated. Indeed, both within and around participatory exercises, we encounter multiple narratives on historical cases of successful innovation trajectories and on how societies gradually overcome natural limitations and impediments through technoscientific innovations. This manner of perceiving time resonates with Appadurai's (2012, p. 26) "trajectorism," which he describes as "a deeper epistemological and ontological habit, which always assumes that there is a cumulative journey from here to there, more exactly from now to then, in human affairs, […]. Trajectorism is the idea that time's arrow inevitably has a telos, and in that telos are to be found all the significant patterns of change, process and history." Thus, time becomes aligned in a specific manner when constituting a phenomenon or an artifact, and specific causal connections are enacted along with this mode of ordering. Technoscientific developments and their intertwinement with societal developments are thus understood as coherently developing and are conceptualized as at least

somewhat predictable phenomena that can be analyzed and eventually managed accordingly.

How is trajectorism mobilized and how does it gather force in the practice of participation?

In much of the talk in participatory exercises and policy making, we encounter the persistent assumption that innovations follow a trajectorial development, "starting from basic research, moving to applied research and then to product development" (Felt et al., 2013). This perception is attractive because it suggests clear causal relationships between input and output. It allows for the illusion that innovation flows can be quantified, which points to "the significance of new regimes of measurement" (Espeland and Stevens, 2008) at work. Problems with innovation flows can then be attributed either to a problem of knowledge transfer from basic research to more application-oriented environments or to the absence of an innovation-friendly societal climate.

Trajectorism is, however, also palpable inside the broader discourse of upstream engagement, as the very "term 'upstream' already displays the deterministic connotation of a necessary direction of flow" (Stirling, 2008, p. 264). It tacitly reinforces the very idea of a linear innovation trajectory and supports the illusion that no further accompanying reflection is needed once a direction is chosen and the question of potential risks has been clarified (Editorial, 2007). Expressing their concerns, participants highlighted the potential danger of having to advance along a single predefined trajectory with little possibility of escape. A participant would voice his concerns, mimicking an industrial actor who just realized that the development is going into the wrong direction. "However, instead of stopping, reflecting, maybe even reversing," the participant continues to argue, a new technology is developed, so that one "can continue this dangerous pathway." He thus describes a blind forward movement that closes down other potential directions: "I don't know where to, but I advance."

The idea of the innovation trajectory also matters when it comes to issues of responsibility. Participants strongly adhering to a trajectory model often conceptualize knowledge production as clearly separable and separated from the diffusion or application of knowledge. In such a model, basic research follows a solely internal rationale and is determined by what nature allows scientists to see, whereas values only appear when applications are envisaged and produced. A citizen participating in round-table discussions about the genomics of fat metabolism outlined this vision in a rather straightforward manner, stressing that "findings are actually already there in some way, aren't they? I mean, they somehow all float around, and [the scientists] just discover them." As a consequence, scientists "probably could not blame themselves for doing something […] particularly negative; because it's there, anyway, and they just discover it." Thinking that knowledge is always already there and only needs to be discovered thus indirectly exempts basic research from engaging with societal values. The ethical, social or legal aspects of innovation would only need to be addressed later, once knowledge is transformed into applications. This in turn allows the conceptualizing of knowledge as inherently apolitical and as only becoming political in a specific application context.

When being asked to deliberate on technoscientific choices, participants first aim at clarifying at which point in time on an innovation trajectory they perceive the development. To do so, they either work with analogies of past techno-trajectories or they construct fictitious products as an outcome of knowledge production that can then be assessed. In the Austrian nanodebates, participants used analogies to genetically modified organisms (GMOs) or nuclear energy to imagine a development in this emerging field, even though they were aware that these innovations would substantially differ (Felt, forthcoming). In the case of engagement with research on fat metabolism, we found participants constructing the fiction of "a fat pill" as an endpoint of the research trajectory, which in turn enabled them to build and assess scenarios of how research might impact society and how society could potentially deliberate on future research directions (Felt and Fochler, 2011). Along with this reasoning, however, participants using the application scenario also transformed their frame of assessment from one focused on innovation governance to one that was more concerned with risk governance.

Even though some people did explicitly want to avoid buying into the trajectorial mode of argumentation and referred more often to network-like innovation models, when they wanted to make a strong statement and wished to identify a moment where responsibility considerations should begin, they tended to switch to the linear model (Felt and Fochler, 2011). Only in this modus did they feel capable of arguing for responsible innovation and were able to point at causal orders, which gave them the power to make claims. Thus, despite some feeling of ambivalence towards this rather simplified vision of innovation, it was the clear temporal order of the linear model that often made it attractive as an argumentative resource.

Finally, when examining participatory exercises and the policymaking around them, trajectorialism is also present in how participation events were understood and advocated. In many ways, Austria has constructed itself as lagging behind international developments with respect to public engagement. In that sense, the development of "technologies of participation" is performed as a "social innovation trajectory." Some countries—those who are more advanced on the trajectory (e.g., the UK or, in the case of the consensus conference, Denmark)—become the leaders, whereas others are either set up or set themselves up as the followers/as in need of catching up (Felt et al., 2013). However, this attitude is not without consequences. In the context of the Austrian citizen conference, to take one example, we observed the organizers stressing the extent to which this type of engagement is new for Austria but had already been successfully performed in many other national contexts (Felt and Fochler, 2010). The unintended consequences of such a framing was that participants in the exercise were more concerned about complying with this progress narrative of participation and with fulfilling the implicit challenge addressed to them: they should be ready to be good citizens (Michael, 2009), ready to perform the expected engagement and to comply with the predefined format and its questions.

Putting time into place: Relating situated pasts and futures

Combining the observations on clock time with those on trajectorism clearly points to the strong impact of specific temporal structures on both how we see the

world and how we imagine its development. It is this perception of time that enables us to imagine that we can—also through performing participatory exercises— "colonize the future" (Giddens, 1999) and to conceptualize it as open "to exploration and exploitation, calculation and control" (Adam and Groves, 2007, p. 2). This temporal ordering invites us to prioritize further thinking in terms of speed, acceleration, frequency and efficiency; it fosters highlighting time scarcity, wastes of time and the need to act immediately "before it is too late." This ordering highlights the political role played by time in debates and justifications of techno-scientific and societal choices, in the formation and proclamation of urgent problems, and in requests for citizens' compliance with certain decisions.

Building on this analysis, we will now move on to reflect how senses of time, be they shared, contradictory or even incompatible, are both transgressive and increasingly global while simultaneously being deeply entangled with specific locations and their history. Although a substantial amount of the future-making observable at the science policy level appears to be preoccupied with making translocal claims and inscribes itself in the flow of European and international policy discourse, empirical observations of participants' debates show clear traces of how projections of technoscientific futures always carry traces of specific places, and thus of specific pasts and perceptions of tradition, that are used to construct futures. Laura Watts' (2008) argument that "different places—their temporality, topography, sociality, and sensory experience—may lead to very different everyday practices, and therefore the creation of very different futures" should thus guide our reflections. Accordingly, the future as well as future-making practices are to be understood as situated (Suchman et al., 2008).

Tensions thus become palpable between a strongly emplaced vision of participation and the idea that spaces of governance and citizenship have expanded well beyond the nation state (e.g., expressed through notions such as multi-sited governance) (Barry, 2001, Ellison, 2013, Felt et al., 2013). Tensions are also apparent between the radical novelty of innovations and more culturally entrenched visions of techno-scientific development. In what follows, I propose to reflect on how the situatedness and a certain continuity of our senses of time matters when engaging with technoscience. In doing so, I will specifically investigate the role of place in how past, present and futures become related to each other and in how "creatures of the future tense" (Selin, 2008) can materialize and be dealt with in the framework of deliberations. This approach means moving our attention from the kinds of futures that are imagined, told and traded in participatory exercises to the work of relating temporal developments to a specific place, to collective memory practices and the capacities of imagination, to how future-oriented agency and relevant actors are mapped out, and to varying understandings of responsibility and its (non)distributedness (Adam and Groves, 2011).

Although the notion of "future" proliferates not only in science policy discourses but also in various public arenas, the concrete conceptualizations of "future" by participants in engagement exercises often remain vague and multiple. "The future" is sometimes conceptualized as a specific event that is supposed (or not supposed) to happen in a specific span of time; at other moments, for example, when people ponder generational justice, the future refers to a present situation that should be stabilized; then again, it appears as an attribute that people or a society can claim—they

are "future-able" ("*zukunftsfähig*"). Sometimes, it is described as a repetition of past futures under a new guise, for example, when people make analogous references to past developments. Or when participants engage with "retrospecting prospects" (Brown and Michael, 2003), i.e., use their recall of locally rooted past futures to either demonstrate the limited anticipatory capacity of certain actors or to argue for their own legitimacy in an attempt to challenge specific dominant assumptions. In particular, in policy documents, the future is often described as commodifiable and empty, waiting to be realized by producing the right blend of sociotechnical innovations and thus dependent on society's belief in the capacity of foresight and prediction (Adam and Groves, 2007). Finally, sometimes, the future is conceptualized by policy-makers and scientists alike as simply "waiting for us" out there, with every society's task being to arrive faster than others and to take advantage of that lead. Participation can and does take different forms depending on which conceptualizations of the future are considered to be important.

Connecting time and place further enables us to devote more attention not only to the always-new ways in which global and local technoscientific developments relate to each other but also to how identities, whether national or regional (e.g., European), are reconfigured through the temporal. Here, observations in diverse forms of participatory settings support Tim Edensor's (2006, p. 526) assertion that nations do not disappear through the predominance of global flows but that these "global processes are accommodated and domesticated in the mundane spaces and rhythms of everyday national temporalities"—participatory exercises being one such space.

How place—in this case the Austrian context—matters when imagining futures can be clearly traced in participatory exercises. When comparing focus group discussions on biomedical technologies in different European countries, Felt and co-authors (2010) showed how broader national techno-political cultures frame participation. Using this notion implies nation-specific differences in the ways in which technologies are inscribed into and give shape to society, with time being an important element in such a process. Participation thus builds on the shared imagination of a national developmental trajectory, on the perceived place in the global innovation race, on recognized sociopolitical structures and practices and their inherent temporalities, as well as on orders of worth at work that seem specific to a particular place (Boltanski and Thevenot, 2006). Thus, the narrative of being a nation that lags behind both with regard to the innovation flow but also with respect to engagement exercises shapes how participants imagine their agency. A lack of shared imagination on concrete past innovation futures that have become successful presents might also frame the potential futures to be constructed and assessed. Or, the idea that some technological innovations might disrupt specific arrangements, such as a nation's privileged relationship to nature, might also have a strong impact on how engagement can evolve.

To capture this local framing, the concept of sociotechnical imaginaries as developed by Sheila Jasanoff (forthcoming) is helpful. She defines sociotechnical imaginaries as "collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology". Such imaginaries encode not only what can or cannot be attained through science and technology but also what a good life is and how it ought to be lived. They are, as

has been shown in the case of participatory exercises on nanotechnology-related issues in the Austrian context (Felt, forthcoming), an essential resource for how people connect pasts and futures in locally adapted manners. Creating a feeling of solidarity and cohesion, these imaginaries offer a shared frame of reference to the past, they are part of an "invention of tradition" (Hobsbawm and Ranger, 1983, p. 2); a tradition that enables (1) judging which innovations are worth addressing in some detail as they are understood to impact societal values and (2) using past experiences with innovations to project or challenge specific futures. "Tradition," is in this context not a stable, unchanged set of practices and values but something that is "dynamic, contested, […] and […] continually invented in the present" (Edensor, 2006).

Participants in anticipatory activities thus try to link up with and follow a set of time-related practices that perform values and norms assumed as shared. Being able to refer to such traditional—and thus legitimate—ways of connecting pasts and futures then offers a feeling of a stable point from which to make assessments; this is attractive to participants in a sociotechnical world that they otherwise describe as rapidly changing. In the Austrian case, the long history of rejecting both nuclear energy and GMOs enables participants to construct a sociotechnical imaginary of the absent, i.e., to believe in the nation's capacity of "keeping a set of technologies out of the national territory and becoming distinctive as a nation precisely by refusing to embrace them." (Felt, forthcoming) They thus feel empowered to choose a local sociotechnical direction different from those of more powerful neighbors enters the realm of the possible.

From these observations, the emplacement of time becomes visible, and it seems essential to acknowledge the situatedness of temporal imaginaries and rituals. Futures, with all of the norms and values embedded in them, may always differ across fields and nation states.

Multiplicities of times and 'temporal inconsistencies'

This last perspective on time and participation focuses on the coexistence of multiple forms of times and some of the resulting tensions or "temporal inconsistencies" (Giesen, 2004) that abound in participants' reflections when trying to anticipate sociotechnical developments. In doing so, inconsistencies are not regarded as the exception but much rather as the normal state of things. Concretely, this analysis is interested in four specific forms of inconsistencies because they seemed to matter most in participatory practice: non-contemporaneity, simultaneity, asynchronicity and divided memories (Giesen, 2004).

The first inconsistency refers to the fact that both citizens and policy-makers alike classify certain ways of reasoning as no longer fitting within contemporary cultural frames and as inadequate for a time in which technoscientific progress is perceived as the pacemaker. In this vein, rejecting or questioning certain innovations is classified by some as backward-orientedness, as technophobia (a notion frequently used by Austrian policy-makers) or as holding onto a "Stone-Age mentality," as one participant expressed it. Thus, the argument of being or not being "in tune with the time," or "keeping up with the time" becomes a powerful argumentative element ad-

vantaging some viewpoints over others or even some participants over others, thus opening up or closing down opportunities for deliberation.

The second inconsistency refers to people's narratives about the challenging feeling of "simultaneity" (Nowotny, 1994): too many technoscientific changes are perceived as happening in different places "at the same time," yet evolving at different speeds and following different rhythms. This perception in turn adds to participants' uncertainty about how their deliberation could potentially fit into this overall temporal choreography of sociotechnical development. Certain technoscientific fields in particular (such as genomics or nanotechnology) are pictured as evolving at a breathtaking speed, and citizens thus report their feeling of confusion. They are uncertain regarding both what is actually happening *right now* in the field as well as about the constellation of relevant actors shaping the technoscientific development at any point in time. In short, they bemoan the spatiotemporal fluidity of the situation that tends to escape scrutiny whenever they attempt to pin it down. These circumstances seem to render participatory governance almost impossible. One participant captured his feelings with the metaphor of a "machine in motion," one "in which there are an incredible number of gears in motion. To stop that again is difficult or impossible."

The third inconsistency is visible in participants' expressions of a feeling of synchronicity or asynchronicity. The idea that people around the table share the idea that certain temporal routines, including the pace and rhythms of technoscientific developments and institutional responses, are adequate and at least acceptable, actually contributes to creating a feeling of belonging to an imagined community (e.g., Edensor, 2006). At the beginning of a participatory event, citizens tended to assume that there was a shared tacit understanding that there is a good timing or correct speed of development that fits with a given society. Upon diving into the engagement exercise, however, new sets of complex interferences between different temporalities became palpable, and the feeling of a deep asynchronicity emerged. Frequently, that feeling was referred to as a lack of coordination, with some actors pushing innovation too fast when other sectors of society are not ready to follow. We encountered complaints about relatively slow, delayed or retarded responses of some parts of society compared with rapidly changing innovation systems or markets. And, we heard arguments that what is regarded as a "good life" would not necessarily fit with the speed of innovation. Therefore, much more than simply accepting the temporalities of innovation as their starting point, participants reflected on their personal experiences, position and values and how these related to those observed for other generations, professions, and technological fields. Temporalities of diverse developments in technosciences and societies in different places interfere in specific space-time points at which they either annihilate or reinforce each other, thus creating situated experiences difficult to anticipate. As a consequences, visions of how to govern these temporal interferences and to create a state of synchronicity differed quite substantially. While some would argue that society needs to catch up with the speed of innovation to fall into a pattern of synchronicity, others would argue against that suggestion, deliberately advocating to take a slower path and thus to force innovation to adapt to society.

Finally, time also matters when it comes to participants' identity in the participation process. While identities might shift within the framework of such exercises (Callon et al., 2009), it is also essential to grasp that participants as members of different

social groups are also carriers of different temporal horizons and collective memories. Giesen (2004) calls this phenomenon "divided memories." As a consequence, the moment in people's lives and their social attachments play an important role in the process of assessing sociotechnical developments and in the positioning work that people can perform. We therefore encounter some moments where different collective memories might collide, while at other times convergences are palpable. One such case was the above-mentioned sociotechnical imaginary of Austrian citizens being able to reject certain technologies if they perceived them as threatening an important part of their national identity (Felt, forthcoming). Major disasters or deeply polarizing events in sociotechnical history then may leave an imprint on how debates can develop and deliberation can occur. It is thus essential to consider the stage of life at which citizens join in participatory exercises. This might considerably affect how they construct their positions, how they can draw on lived memories and how they can claim more plausibility and authenticity for their judgments regarding long-term developments.

Discussions and Conclusions

The purpose of this chapter was to render time structures, which are so consequential for the development of contemporary societies, visible, and to unpack them and thus to transform them from "habits of mind to moral and conceptual tools" (Adam, 2004). The discussion aimed at showing how profoundly time is not a given and static entity but always a "result of the connection among entities" (Latour, 1993, p. p 76) and how our engagement with time defines us. Employing the notion of "choreography of temporalities" reminds us to be attentive to how different forms of time are connected, how they overlap and intertwine, and how they collectively shape participation.

The following conclusions will be grouped around four concerns essential for rethinking public participation. The first points to the **ontological politics of temporalities** at work in participatory practices, which shape how innovation is conceptualized, problems get assembled, how publics are made, and how potential action and responsibility is imagined. This ontology matters in how participation is framed by policy-makers, practitioners or researchers organizing such events as well as by the participants themselves. Linear innovation models as well as the need for speedy and steady innovation flows form a robust but seldom-questioned basis from which projection work is performed. This basis also infuses versions of potential futures with plausibility, creates the illusion of control and delimits the realm of possibilities.

What are the consequences of such an observation? When performing and analyzing participatory exercises, it is essential to more explicitly address these temporal ontologies and to question them. This questioning means that the implicit understandings of the temporal developments of both technoscience and society should be challenged as much as the concrete issues at stake. This approach connects to a more general critique of the classical conceptualization of upstream engagement (Joly and Kaufmann, 2008), which highlights the need for more fine-grained models of innovation, rendering visible the complex networked character of any innovation. Yet, a time-sensitive analysis pushes this critique further, underlining the need to render visible

and thus debatable the multiple temporal regimes governing any innovation and their relationship to society. Innovation policy and participatory elements within it thus need to be assessed and understood in light of these often-tacit assumptions.

The second concern is best captured by analogy to Annemarie Mol's (2008) distinction of a logic of choice versus a **logic of care,** a distinction inhabited by a strong temporal order. Policy makers appear to be quite attached to the idea that there is an ideal moment in the developmental trajectory when sociotechnical issues can be assessed once and for all; after that 'moment of engagement,' research should be left on its own again. This temporal understanding of participation is intimately tied to the ideal of efficiency and planning and is in line with the idea that this mindset allows innovators to grasp the windows of opportunity. In observing participatory moments, however, we note the complexity of developmental understandings at work. Paraphrasing Tim Ingold (2000) in stating that people know as they go and not before they go, my observations not only highlight (in line with other authors) the centrality that we need "iterative, continuous and flexible processes of learning" (Stilgoe et al., 2013) but also draw specific attention to the importance of the temporal choreography of technoscientific developments and participation. If participation is not limited to taking up issues already preformed, then time is necessary to collectively carve out what is at stake, and it has to be admitted that any single actor involved might shift perceptions in the course of this process. Continuing this line of thought and assuming that issues and publics are always co-produced (Marres, 2007), we have to consider that specific temporalities of participation perform specific publics while also determining which publics will never enter the realm of the possible (Felt and Fochler, 2010).

If we do not conceptualize participation as part of a wider logic of choice, then caring for technoscientific developments in contemporary societies through participation would mean that detours or controversies in the context of participatory events should not be conceptualized "as a waste of time that could be dispensed with" (Callon et al., 2009). Rather, we should perceive them as valuable moments during which different perspectives are opened up, during which tacit orders are identified and can be explored, and during which the complexities of technoscientific issues can be more fully addressed. This means that we must move beyond a purely physical understanding of time, the speed of decision-making not necessarily being a sign of efficiency or success in an engagement event. Understanding participation as part of a wider process of caring for how innovation shapes collective societal futures and considering the contextuality and complexity of this relationship thus also requires a different imaginary of the timescapes in which such undertakings are embedded.

The third concern addresses the relation between temporalities and ideals of responsibility. If participation is understood as a core element in realizing what is labeled "responsible research and innovation" (Stilgoe et al., 2013), it becomes essential to address what I call "**responsibility conditions**," in this case, the temporal boundary conditions under which responsibility can be envisioned and exercised (Felt, 2014).

Let us turn our attention to three exemplary ways in which time has been shown to matter with respect to thinking about the relationship between innovation, responsibility and participation. First, the paper has argued how the short-term nature of many participatory exercises excludes the formation of specific collectivities, that time as a resource that an individual can dispose of is unequally distributed in society and

thus not everybody can participate in an equal manner and finally, that the complex temporalities of innovation dynamics are difficult to examine in a short one-time only event. Second, we need to consider what Adam and Groves (2011) have called the "timeprint" of both innovation imaginaries at work but also of the participatory exercises themselves. This viewpoint draws our attention to how much the present and its prevailing knowledge practices lead to a specific way of consuming "the future potential" of any innovation and alerts us "to the problematic relation whereby current future making extends far beyond any capacity to match our concern and responsibility to the temporal reach of our actions" (Adam and Groves, 2011, p. 26). Thus, the way future-making takes place in innovation discourses but also in the accompanying participatory measures needs to be reflected not only as a way performing foresight but also as an act of doing and of doing responsibility. Third, tight time schedules for participation, or more broadly, the lacking time resources for reflecting on issues of responsibility in research as well as the omnipresence of discourses on speed, acceleration and competition lead to a transformation from being 'response-able' to being 'account-able.' The former notion—'response-able'—captures the ability to produce responses to the fluidity of the sociotechnical issues at stake in participation and thus to explore the future potential of innovations as well as the potential futures that come along with them. The latter notion of being 'account-able' reflects the transformation of these complex and open-ended ways of thinking into a much more standardized and time-efficient reaction to the call for responsibility. Being 'account-able' is then tied to standardized and 'form-ularized' (e.g., ethics forms are an excellent example for the widespread use of forms in accounting practice) relationships (Becker, 2007) when addressing issues of sociotechnical change. In turn, this relationship generally also means accepting predefined power and authority structures and valuation regimes.

These exemplary ways of looking into responsibility conditions clearly point to the need to more closely consider temporal choreographies and the formative power they exercise to better grasp the dimensions of participatory exercises as spaces of knowledge-making and collective experimentation as well as part of a new regime of responsibility.

Finally, participatory exercises should not be solely directed at imagining specific technology-related futures and thus to practicing a narrow perspective of anticipation; they should instead more carefully open up the issues at stake and invite the creation of wider connections between various elements available in our "knowledge realms of perception, memory and anticipation" (Adam, 2010). Participatory exercises and the ways in which their temporalities relate to a specific place do not build solely on the specific imaginaries of **citizenship (and thus of democracy),** roles and obligations; instead, these exercises actively contribute to performing them. This means that attention needs to be paid to the stories told, the temporalities embedded in them and their role in making identities, be they group-specific, national or personal. This analysis showed the centrality of people's memory work in participatory settings as well as the broader sociotechnical imaginaries to which they can refer when trying to assess new technologies. Thus, taking participation seriously and making it an important part of societal learning would mean paying close attention in the realm of policy-making in particular but also to the argumentative repertoires across time, space and technologies. Thus a comparative gaze is essential for understanding the

different temporal regimes at work and for fully grasping how such spaces of engagement are sites where traditions are made and enacted, where specific pasts and presents get connected as well as where global and local temporalities need to find arrangements. In this sense, participatory experiments should not be regarded as the end point of a process or as an exercise in making choices but instead should become a locus where technocultural identities are made and unmade, where understandings of the relationship between the local and the global are negotiated, where sociotechnical memories are deployed and actualized and, thus, where the very meaning of citizenship, democracy and the idea of the nation state are continuously (re)shaped (Edensor, 2006).

Embracing a time-sensitive perspective to participation thus not only allows participants to identify the different temporalities deeply inscribed into events, processes, places and things related to technosciences but also to widen the scope of what we can learn from and what can be learned within such exercises.

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[1] http://ec.europa.eu/programmes/horizon2020/en/h2020-section/europe-changing-world-inclusive-innovative-and-reflective-societies

[2] This paper builds on observations of participatory exercises in Austria, but also on research conducted in the framework of the following projects: "Evaluation of the discourse day on ge-netic diagnosis 2002," funded by the Austrian genome research programme GEN-AU; "Chal-lenges of Biomedicine. Socio-Cultural Contexts, European Governance, and Bioethics," funded by the European Commission in the 6th framework programme, Contract No. SAS6-CT- 2003-510238; "Let's talk about GOLD. Analyzing the interactions between genome re-search(ers) and the public as a learning process," funded by the Austrian genome research programme GEN-AU as an ELSA project; and "Making Futures Present. On the Co-Production of Nano and Society in the Austrian Context," funded by the FWF (Austrian Science Fund) grant number P20819. Pro-ject leader or coordinator for all projects was the author of this chapter. I would like to acknowledge the contribution of all colleagues involved in these projects, both as collaborators and advisors.

[3] In German, this time is aptly labeled free time (*Freizeit*). This expresses the illusion of control over this temporality.