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Technology of Imagination

A Card-based Public Engagement Method
for Debating Emerging Technologies[1]

Ulrike Felt, Simone Schumann, Claudia Schwarz, Michael Strassnig

This article introduces a group discussion method for public engagement and qualitative re-search on emerging technologies. The method uses card sets and a deliberative choreography in order to facilitate the development of citizens' individual and collective imaginations of nano-technology. The aim is to better understand how citizens develop and negotiate positions on unfamiliar technologies, what resources they employ and what role specific inputs can play in this process. By drawing on concepts from Science and Technology Studies, the paper dis-cusses the design of the methodological setting and its embedded presumptions ("script") as well as how citizens in four discussion groups re-interpreted (elements of) the setting (their "de-scription"). The method's potential lies in balancing individual and collective positioning work, showing participants' modes of ordering, addressing non-chosen cards/issues, enabling citizens to scrutinize expert positions and enhancing their capacity to imagine how (nano)technologies might develop in future and participate in shaping specific futures.

1. Introduction

> *A: I was surprised that so many people can so enduringly discuss an issue that is hardly known …*
>
> *B: … [that's because] we had good cards*
>
> *(Workshop participants)*

Over the past few years, the governance of emerging technosciences has turned more and more towards public engagement at ever earlier moments (i.e. upstream) in the innovation process (Wilsdon and Willis, 2004) when public attitudes are thought to be less entrenched and technological trajectories as well as societal choices are perceived as still open for debate. Consequently, a broad variety of engagement methods has been developed and tested. Yet, these practical realisations of a seemingly consensual commitment to tighten the relationship between technoscience and society have proven somewhat problematic (e.g. Irwin, 2006).

Nanoscience and -technology (in the following referred to as nano)[2] is among recently emerging technoscientific fields, challenging public engagement efforts in a

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number of ways: (1) While nano has become a buzzword in public debates, it does not refer to a clearly delimited object or field. As a so-called enabling technology, it crosses a broad range of disciplines and different areas of technological development such as food, information and communication technologies, or medicine. (2) Nano seems to illustrate the Collingridge dilemma (1980), which points towards the difficulty of finding the 'right moment' for intervening in technological developments: When a ready-made technology has arrived in society, impacts are predictable but society and technology may have already become so closely intertwined that modifications can hardly be accomplished. On the other hand, while socio-technical trajectories are much more open throughout earlier phases of the innovation process, knowledge of potential consequences remains rather scarce. In that sense, doing upstream engagement entails inviting people to accomplish quite far-reaching imagination and anticipation work. In the case of nano it could even be argued that the technology is both upstream and downstream in its innovation process, since nano-products are already available on the market while it is simultaneously seen as a future technology. (3) In a number of countries nano is not debated in the wider public, but just among techno-political elites in terms of risk governance (health, environmental). Hence, following Marres' (2005) assumption "no issue, no politics, no public", public engagement initiatives are confronted with citizens who cannot easily draw on publicly available vocabularies, positions and framings. (4) Nano is a technology that is closely entangled with socio-technical and economic promises and expectations. Hence, policy makers started to use invited engagement exercises instrumentally to legitimize nanotechnological developments and investments (Delgado et al., 2010). In this vein, the dominant way of dealing with uncertain futures has been to develop scenarios informing both policy and public debate (Bennett, 2008; Rip and te Kulve, 2008; Türk et al., 2005). Using these methods, however, comes with the "risk of avoiding or downplaying the present by centering debate in the future" (Barben et al., 2007: 993) and prematurely narrowing people's imagination of possible future developments.

These observations triggered our interest in developing a novel methodological approach for addressing emerging technosciences such as nano with emphasis on the following aspects: It should allow citizen engagement in the context of a largely missing public debate without de-parting from future scenarios. Further, the method is supposed to contribute to qualitative re-search by focusing on the very processes through which people engage with complex new is-sues, the argumentative resources they use, the socio-technical assemblages they create, and the value systems they relate to. Besides, having a better understanding of such processes could provide an essential reflexive input for research and policy-making with regard to emerging technologies.

Thus, the aim of our methodological approach was to create a space encouraging participants to develop and negotiate individual and collective *imaginations* about nano. We understand imaginations as outcomes of work based on the ability and practise to relate and associate what is perceived as possible with what is perceived as

"given" or "real". Imagining is both individual and collective, it is a genuinely social activity; it cannot be reduced to mental images or confined to the "non-rational"; it is not exclusively directed towards the future (prospective) but also to-wards the past (retrospective).

We are aware that any method is always both normative and performative, and hence participates in producing the kind of reality it claims to simply observe (e.g. Law, 2004). Drawing on Akrich's (1992) approach from technology studies, we understand the method we developed as a *technology of imagination*. Akrich points to the fact that any design – and thus also a participatory one – contains a script defining "a frame-work of action together with the actors and the space in which they are supposed to act" (Akrich, 1992: 208). The script hence pre-scribes certain roles to participants and defines how they should adequately make use of the designed space. But Akrich also makes us aware that users might have different visions of a technology, attempting to redefine or reject the script, i.e. de-scribing the technology. The active role of the users is thus given much more attention in the analysis than this is usually the case within qualitative research methodologies. Consequently, this paper reflects not only how we as designers imagined and framed both our method and its script, but also how participants actually dealt with it, their description of the technology. Following this logic, the paper starts out by discussing the development of our *technology of imagination*, which we named IMAGINE, and the de-sign choices made in this process, thereby making the script visible. After that, we analyze how participants made use of the method, i.e. their description. In conclusion, we reflect on the potential and limits of the proposed engagement method for discussing emerging technologies.

2. Creating IMAGINE

Taking the considerations outlined above as a starting point, we designed the method and setting to meet the following conditions:

(1) With regard to the absence of a wider public debate, it should offer the participants a repertoire of argumentative resources to stimulate discussion without closing down or narrowing issues in the first place;

(2) the discussion should not be framed by experts, i.e. neither external experts should be invited nor did we want to present ourselves as such;

(3) citizens were not expected to possess (expert) knowledge or detailed information on nano in order to participate in the debate;

(4) both the offered resources and setting's format should give voice to all participants independent of their background or experience;

(5) the choreography of the discussion setting ought to allow for balancing between individual and collective positioning;

(6) we wanted to trigger an extensive debate that should not to be too demanding in terms of time commitment, concentration and capacity to engage;

(7) participants are not required to arrive at a common output or consensus, which could lead to a premature reduction regarding the scope of opinions (Horst and Irwin, 2010), but to focus on the discussion process.

To meet these conditions we opted for a card-based method. This choice was guided by the assumption that – given the absence of a broader public debate on nano – we could not expect the invited citizens to already have concrete ideas concerning nano and that therefore some input would be needed to stimulate debate. But we did not want to provide ready-made scenarios in order to let participants develop their own imaginations of what was at stake. To do so, we produced different sets of cards as support material and a particular choreography of how the different elements of the setting fit together.

Cards have frequently been used as stimuli for debate and as research tools in qualitative research as well as in public engagement with science and technology. In the context of participatory methods, a card game called PlayDecide[3] has been developed to structure debate and finally decide on a common policy position. Although we adopted the idea of providing distinct sets of cards, some aspects of the PlayDecide script seemed problematic against the background of recent debates on public engagement. For instance starting with an information phase, which is decoupled from a discussion phase, suggests that citizens have to be informed first to be able to build their positions and debate them afterwards collectively. We did not want to use info cards with "facts about nano", which would have implied a hierarchy of knowledge with scientific knowledge and its rationale dominating over other kinds of knowledge (e.g. personal experiences) and their respective rationales of interpreting and ordering the world (Wynne 1992, 1995). Additionally, the idea of a "shared group response" at the end of debate forces consensus and thus frames the course of discussion, which was not our intention.

In interview contexts or focus groups, cards have been employed to stimulate talk about sensitive issues (Sutton, 2011; Chang et al., 2005) and as "focusing" or "ranking exercises" to analyze people's ways of ordering and classification (Bloor et al., 2001; Kitzinger, 1994). What is specific of our approach is that we wanted to keep the choice of cards at the level of the individual and to apply cards not only to stimulate but also to structure a longer discussion process. Thus, we developed IMAGINE so that it would consist of four successive stages and their respective sets of cards, that being story, application, issue and future cards. This choreography is supposed to invite participants to focus on specific aspects and to encourage them to change their perspective on the issue when entering a new stage. The cards aimed at capturing the breadth of the available positions and issues and were meant to be handled as an open resource box, which should both allow flexibility and provide some structure. They consisted of textual elements, with the exception of the application cards which included pictorial elements. Their content was produced by analyzing the nano field in Austria, in particular publicly available resources (PlayDecide, media reports, policy documents and local websites), as well as material from a series of qualitative interviews we had previously conducted with Austrian stakeholders such as scientists, NGO representatives and policy makers.

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[3]   PlayDecide is based on the Democs cards, a card-based public engagement tool (see http://www.playdecide.org, URL last consulted 03 July 2011).

In total, we organized four IMAGINE discussion workshops with Austrian citizens in November 2009 and January 2010. Each of these workshops focused on a different field of nanotechnological application – medicine, food, ICTs/surveillance, and consumer products – for which the cards were adapted. We decided on four different application areas, assuming them to be linked to diverse pre-existing, often culturally entrenched socio-technical frames, thus impinging differently on how nano might be perceived and negotiated. Every workshop involved six participants, was facilitated by a moderator, and lasted for four hours. Based upon prior experiences (e.g. Felt et al., 2008; Felt et al., 2009a) with shorter settings such as focus groups and with long-lasting formats that would last for entire days and longer, a timeframe of four hours was chosen because this length was expected to guarantee both citizens' availability and sufficient length of debate.

Having explained the basic principle behind the cards, we will now present the setting's choreography: After a short welcome by the moderator, each IMAGINE workshop started with the screening of a short video[4], which was intended to lay out the topic and to depict the complexity of the issue. Additionally, showing the video was supposed to avoid that the moderator would have to introduce the topic, thereby inadvertently slipping into an expert role. The screening also allowed the participants to duly arrive at the table. Afterwards, the first of the four stages began. Each of the stages, which generally lasted around 40-45 minutes, started by inviting the participants to take their time to go through the cards in the respective stack, choosing a defined number of cards which seemed most relevant to them and putting them on the space reserved for this stage on the board in front of them (see Figure 1). The participants were invited to apply their own rationale in selecting the cards, be it that the position expressed on the card is judged as appealing or controversial. Once the cards had been selected, participants were asked to explain their choices. The moderator was supposed to intervene only if the discussion did not start independently, to ensure that group members had equal chance to explain their choices, or to inquire for further elaboration of arguments. After presenting their individual choices, the discussion moved into a more open and interactive phase.
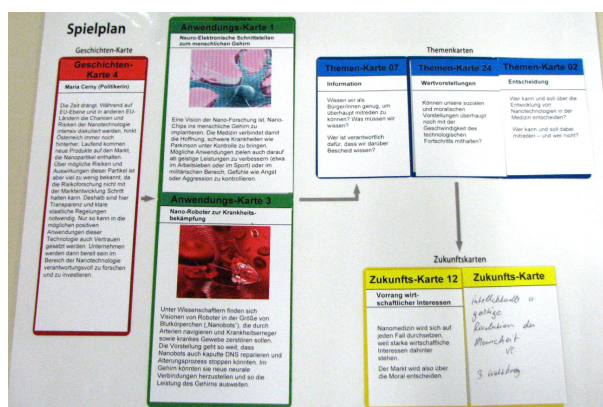
Fig. 1: Board with cards in front of a participant

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[4]   The seven-minute video presented different definitions and examples of nano, its historical development, an overview of the scientific disciplines involved in nanoresearch, and a range of applications and products which are currently available on the market. The video ends with the question of how issues of nano might concern "us as citizens", leading over to the first stage of the discussion.

In the first stage, the participants were asked to read the first stack of cards (6-7), the so-called story cards, and to choose one card. The story cards captured positions of heterogeneous actors and were based on condensed and slightly reformulated statements. We thought that approaching the issue via personal stories would facilitate participation. Actors represented on the cards were researchers, physicians, ethicists, industry representatives, policy makers, NGO representatives, science communicators and authors of letters to the editor.

Once the discussion seemed saturated, participants were invited to change perspective and pick up the application cards, which introduced much-discussed nano applications, ranging from products already available on the market over others currently under way to more visionary ones. Illustrated by an image, a short description reflected on the way a particular application was presented by scientists, media or industry. These cards included promises, possible benefits, but also potential problems and risks. The discussion thus moved from actor accounts (first stage) to application contexts (second stage), challenging the participants to shift their frames of reflection. In the second stage, participants were invited to select two cards out of six to seven options giving them the chance to apply different choice rationales.

After a break, the participants returned to the table and were encouraged to choose three issue cards (out of 23-31) or write down their own issues on blank cards. The large number of cards represents the multi-facetedness of potential issues. By prescribing a choice of three cards we sought to cover a wider range of possible issues in the debate. The issue cards point out ethical, environmental, health, economic, legal, political and social aspects of nano and thus explicitly situate emerging technosciences within a larger socio-political context[5]. These cards carry a short heading and text that was usually phrased as a question, leaving it to the participants to either formulate a response or to develop, criticize or support a position.

During the final stage, participants were invited to engage with certain expectations and promises concerning the prospective development of emerging technosciences. This was also meant to assemble and condense arguments about the future which had already been made in prior stages. In order to achieve this, the participants were asked to choose two future cards (out of 17-21) or to write their own. The cards comprised very short statements about future developments on different levels: Some addressed the broad range of more or less concrete nano-visions – e.g. making society more efficient and safe, or losing control over technology – that circulate in specific societal arenas such as media, science policy, or science. Other cards extrapolate present issues into the future, for example by stating that existing societal imbalances could intensify. Additionally, future cards also raised the question of agency of different actors (e.g. public, policy makers or industry) in shaping these futures. We explicitly avoided presenting vigorous utopian and dystopian scenarios, leaving it to the participants to come up with such visions on their own.

Arranging the four stages in this specific order was based on several considerations: Starting with the story cards was meant to embed nano first in a societal context

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[5]   The cards tackled issues such as responsibility, religion, decision-making, promises, regulation, problem definition, market needs, communication, transforming nature, progress, privacy, discrimination/equality, risks, the role of the public, experts and policy in decision-making, public trust, financing of science, or product labeling.

involving heterogeneous interests, roles and actors so that the participants come to know different standpoints. To avoid framing the participants' role solely as consumers – as it is usually practiced in market research – we introduced applications as a discussion subject not until the second stage. In the two stages so far, participants could develop issues on their own, which are then, in third stage, explicitly designated and supplemented by additional ones brought in by the cards. Against the background of a hardly visible public debate on nano, we assumed that the participants need to engage with the issue in the first three stages in order to be able develop more differentiated imaginations of the future.

Coming back to the initial reflections which became an integral part of the script of our engagement method, we now summarize the key assumptions of our approach. To begin with, the alternation between phases of selection and discussion over the course of each stage allows for shifting from individual to more collective moments: While reading and picking cards is supposed to be conducted individually, allowing for introspection, the following discussion asks for a positioning towards the group and collective negotiation of these positions.

Second, dealing with the cards individually can also be seen as a pause from the more intense discussion phases. During this break positions can be reconsidered by reflecting what has been debated earlier on, which is particularly important for those less experienced with discussion settings. As the debate lasted for four hours, these interruptions were also conceptualized as having a regenerating function to keep momentum in the debate.

Third, the cards were meant to embody functions of a moderator, rendering her presence less visible. In that sense the cards take on the role of indirect, decentralized elements of moderation, as they are carriers of a number of implicit rules. This setting might remind one of card game situations where certain orders are at work and everyone has his/her turn to contribute.

Fourth, the cards create a seemingly paradox situation: experts such as scientists, politicians or NGOs are physically absent but virtually present through the statements on the cards, especially on the story cards. The cards thus offer the possibility to raise and discuss expert positions without experts being physically present. Our underlying assumption is that their *absent presence* enables the participants to express disagreement and challenge claims more openly than in face-to-face encounters (Myers, 1998; Felt et al., 2009a).

Fifth, since socio-cultural factors affect how people actually engage in interactive group settings (Farnsworth and Boon, 2010; Warr, 2005), we considered that participants with lower formal education might be disadvantaged in the discussion. Without succumbing to the illusion that the cards would put everybody on equal footing, we conceive them as material for participants who possess less rhetorical resources to formulate their opinions. So the cards can be understood as an effort of balancing within heterogeneous groups.

Finally, being confronted with the task to read and decide on cards in a limited timeframe generates a situation in which participants have to choose quite spontaneously and thus might apply more tacit than explicit selection criteria. Their ex-post

explanations bear rich analytic potential in showing how they try to verbalize and rationalize their choices.

Before moving to the analysis, we want to explain briefly how the participants were recruited. Flyers were sent as bulk mail to households in selected Viennese districts and distributed at science museums and science events. 51 persons sent back the flyer, filled out with their sociodemographic details and indicating their specific interest in the topic and in participating. Out of these we selected six citizens for each discussion group.

Our *politics of invitation* was based on the premise that decisions about who is a legitimate participant in social science research as well as in public engagement settings are always guided by implicit assumptions about the public and how it should be represented in these settings (see e.g. Felt and Wynne, 2007), for instance as individual informants in surveys or as representatives of a relevant social group in focus groups. Our groups were conceptualized as "mini-publics" (Goodin and Dryzek, 2006) representing a diversity of positions and social backgrounds. Since we are interested in the processes of interaction, and these might include both controversy as well as consensus, we did not exclude engaged citizens from our setting, which is often the case in invited forms of participation in order to avoid controversy (Irwin, 2006). We opted for a heterogeneous composition of the groups because differences between participants "allows one to observe not only how people theorize their own point of view but how they do so in relation to other perspectives and how they put their ideas 'to work'" (Kitzinger, 1994: 113). Thus, we sought to compose a diverse group concerning age, gender, educational and professional background as well as interest in the topic.

3. How the participants de-scribed IMAGINE

We will now explore the participants' use of IMAGINE as a *technology of imagination*, reflecting on how they embraced their attributed role in the setting, struggled with it, or developed workarounds, in short, how they described it. Proceeding in two steps, we start by analyzing the participants' practises that are sparked by the materiality of the cards and then turn to how the cards were used to support, build and express their positions.[6]

3.1. Working with the materiality of the cards

Maria carefully examines each card and then puts it on one of the two piles she created next to her board. Having finished a first round of card reading, she puts one of the piles aside and runs through the remaining once again, deeply concentrated. She hesitates and stops, puts one card aside and continues reading the others, just to stop once more to put down a second card. She then tilts her head and places one card on the dedicated space on the board.

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[6] This empirical analysis bases on the transcribed audio recordings of the four IMAGINE workshops and on participant observations during the workshops. All quotes from workshop participants are indicated by quotation marks in the following.

This observation during one of the workshops captures how a participant dealt with the cards to make her choice. But the material dimension of the cards was not simply confined to practices of choice throughout the selection phases, it was equally an integral part of the discussion process when participants referred back to moments of choice as well as to specific cards, for in-stance by re-reading a card when others were talking about it or in raising a specific card when wanting to make a point. In the following, we examine two main practices in which the cards' materiality has been pivotal: ordering and choosing as well as memorizing.

Ordering and choosing practices

A central characteristic of our method is the recurring phases of choice, which allowed each participant - but also us as analysts - to carefully render traceable their *modes of ordering*. We observed that in a first step quite a number of participants immediately put aside some cards seemingly less relevant to them. Then they started a new round of sorting out the remaining cards. Individual selections were referred to at several moments in the debate, e.g. when ex-pressing support for another person's choice someone mentioned that this card had also been 'shortlisted' but had not made it into the final choice. At other times, participants distanced themselves quite explicitly from discarded cards as a way of sharpening their position. These material practices of ordering and choosing were an essential part of the argumentative work that participants accomplish, and serve as a crucial analytical resource for social scientists in order to understand the issue at stake (c.f. Michael, 2004). Here, three features seem of particular interest:

First, on an *individual level*, we observed how people excluded certain cards, while keeping others at the periphery and moving others to the centre. This took place without any verbal ex-change between the participants, often they would not even raise their eyes from the cards. In stages where several cards could be chosen, partici-pants sometimes also pondered over the order of and the relations between their selected cards by rearranging them several times on their boards. This material order was translated into epistemic order when they later explained their choice. In almost any group we identified one person who resisted the pre-scribed 'rule' of disclosing one's choices, which is also materialized on the board (see Figure 1). These persons either chose more cards than the designated number or they refused to make a choice at all. This can be interpreted as a strategy to conceal one's choice, to make use re-sources from several cards, or to simply keep an overview.

Second, the debates following the selection phases show that further reordering was triggered when individual choices were explained to other participants. Partici-pants tried to identify shared choices of cards and in doing so moved from the individual to a more *collective level* of argumentation. Cards that appeared several times were gradually moved to the centre of the de-bate, while cards that were hardly ever chosen remained more on the margins or were not de-bated at all. However, such a process must not necessarily be interpreted as aiming for convergence or consensus, because even when people attributed relevance to the same card, their reasons for choosing the same card usually differed considerably. We also encountered excep-tions where a single choice managed to move to the centre of the debate when sever-

al participants remembered that they judged the respective card as interesting during the individual se-lection phase.

Third, choice among a given, limited and known set of options (i.e. selecting a defined number of cards from a stack) enables social scientists to observe, make visible and explicitly address *the non-chosen*. Hence, we can investigate present absences (Law, 2004), that is, themes and issues that are either collectively judged as being of minor importance or that are representing a culturally rooted taboo but nevertheless framing and enacting power on what is present. Consequently, it was also the role of the moderator to bring those absences back to the table by inquiring why certain cards had not been chosen. In doing so, it is possible to explore the reasons for exclud-ing certain themes and issues from the debate *in situ* rather than only reconstructing them analytically in retrospect.

Memory practices

As public engagement with emerging technologies often demands from citi-zens to manoeuvre in a quite unfamiliar terrain, the cards became crucial memory devices accompanying the participants' journey through this unknown territory full of new terminology, questions and ideas. The possibility of putting chosen cards down on their boards enabled the participants to relate choices made in later stages to once made earlier on. Also, it allowed them to reflect on shifts and changes as well as on the coherence of their positions. One participant, for example, stressed in a later phase of the discussion that for him "now the debate is back to my first card". He picked up the respective card, showed it to the group, and continued to develop the argument he had gradually elaborated throughout the debate. With this practice, he materially re-minded the other participants of his position, using the card as a 'material ally'.

Additionally, the cards had several functions in terms of memorizing such as fol-lowing other people's arguments by picking them up and reading them while other participants were making their points or remembering own readings. In particular, people less familiar with the topic and discussion group settings benefitted from hav-ing a set of arguments available literally at a glance. Hence, we argue that to a certain degree imbalances between the participants can be reduced to warrant a more easy participation. Finally, remembering which cards others had picked helped to relate specific cards with particular people at the table, thereby identifying potential affini-ties and finding discursive allies to build coalitions with.

To summarize, positions, issues and objects entered the discussion through the cards and stayed there via their material form, regardless whether they where being chosen or not. They became a device for collective memory which was used to recol-lect choices and negotiation processes both on an individual and collective level. The cards thus became navigation devices that allowed keeping track of the development of the discussion.

3.2. Positioning practises

In the following, we analyze three central dimensions of participants' position-ing practices with a special emphasis on the cards' role in these processes, outlining how the individual choice of cards was explained, rationalized and legitimized; what

role the cards played for more collective negotiation of positions; and how the cards and the setting's choreography contributed to participants retro- and prospection.

Arguing card choice

The ways in which participants explain and justify their particular card selection provides in-sights into the rationales and agendas they either bring along or develop during the debate. Reasons for picking cards certainly were as multifaceted as the citizens' backgrounds: Some of them chose a card because it represented a problematic aspect such as "the pretention of re-searchers, their paternalism". Others argued in favour of more positive or promissory narratives such as "if food is enriched [through nano] … and if it tastes neutral then I would find that not bad at all". Some picked cards they "thought that definitely nobody else would pick" while others even chose those which were "not clear from the start". Despite this variety, we identified two main rationales underlying participants' choice of cards:

The first, used by fewer participants, was to translate potential nano-related issues into pre-existing personal agendas. Their motives for choosing a card or highlighting specific parts/subarguments were obviously connected to a more general, often quite normative, argument they wanted to make. For instance, in the discussion on nano in the food domain, participants with rather strong ideas about a specific lifestyle (e.g. with a clear preference for organic food) immediately identified the idea of nanofood as fundamentally inacceptable. Over the course of the debate they would only marginally open up to other perspectives or arguments but pertain their strong normative assumptions.

The second kind of rationale, that we observed more often, was mostly performed by those who did or could not fit nano into a specific personal agenda. Their dominant strategy was to balance between different cards with respect to their argumentative positions, consequences, actors foregrounded and so forth. This process of balancing was carried out on two main levels: On an individual level, participants frequently tried to identify and select cards where one presents a rather positive and the other one a more negative aspects of nano. This could either mean that they were in the process of developing a position, they did not want to decide yet or they had a general tendency to leave things open. This strategy turned out problematic in the first stage where the group was supposed to pick just one card. As a response to the setting's script some 'rewrote' it by choosing two cards or referring to a second card when it was their turn to explain the card choice. On a more collective level, some argued that their choice was influenced by a perceived need to balance the overall discussion, e.g. by picking what they saw as so far neglected issues.

What holds for both strategies is that participants strived for internal coherence of the choices they made. They did not conceive the different stages of the discussion process and the cards they chose as disconnected entities, but made efforts of linking them. They conceptualised them as "package" – as one participant explicitly called her choice of issue cards – and constructed causal connections or arranged them into a temporal narrative.

Card-facilitated interactive positioning

As group settings get their richness and vividness not merely from individual statements but also from manifold interactive processes between the participants, it is central to ask what role the cards and the choreography played for how the participants collectively negotiated their choices and positions. The following analysis focuses on three different levels: on the level of the cards, in particular the interpretative flexibility of their content; on the level where the cards involved themselves as "social actors", as part of a network in which human roles became translated into cards; and on the level of the choreography of the setting, that is, how individual and collective positioning were entangled.

As noted above, participants entered the debate through arguing their choice of cards. The cards allowed them to feel more comfortable and save in the group setting as they had elements at hand on which they could base their arguments. Yet, most of them did not take the cards as immutable entities, but rather used specific elements (e.g. headings, phrases or words) as discursive building blocks and re-arranged them in order to build their position. In doing so, they sometimes even changed the original meaning of the argument. The cards sup-ported this practice as their textual elements are characterized by an *interpretative flexibility*. Like "boundary objects" (Star and Griesemer, 1989), they are robust entities yet flexible enough to be open for multiple interpretations. This became particularly apparent, when people stated that they had picked the same card yet had "understood it differently". This also explains why they did not perceive the cards as ready-made but rather as material they used creatively and for their own purpose. To demonstrate this point, we refer to a particular situation during the issue card stage in the workshop on ICTs and surveillance: Initially, most participants chose the issue card titled "Ethics" which posed the question whether "ethics should have a bigger role in debates about nano?" The participants attached different meanings to the word "ethics": While for one participant it referred to ethical behaviour of those responsible for governing nano as opposed to "corrupt controllers", others used it to describe a moral authority that should con-fines technological development, which was either regarded as representing an anti-technology position per se or as a legitimate source of moral guidance. We argue that ethics as well as other terms potentially work as a boundary object through which different positions can be articulated and negotiated, nevertheless making the issue recognizable as a shared one.

Second, the cards served as a kind of proxy through which positions and roles of societal actors and stakeholder could be indirectly challenged, as participants tended to avoid direct confrontations or conflict in order to create and maintain a socially agreeable and robust space. Confrontations that some participants 'withdrew behind cards' as a way to step 'out of the line of fire' when others were challenging something they had said. This was the case when a participant responded to an offensive argument by stating "but the card said so". Here, she insisted that she was not giving her own opinion but was just rephrasing the card's content and, hence, cannot be held accountable for its message. This illustrates that the cards helped to bypass mutual critique and 'tamed' the debate in certain respects. The cards, however, allowed also for different ways of challenging as illustrated by a situation which took place immediately after the se-lection of the story cards in the discussion group on consumer prod-

ucts: One participant explained why he had chosen a card with a statement of an industry expert. When he was renarrating the expert's account, which stated that nano-particles in sunscreens could "probably" not permeate skin, he became upset and criticized the expert's "arrogance" and "patronizing of the public". Other participants joined his critique and in this process a shared position emerged among the group members. Thanks to the cards, expert positions were made present without simultaneously requiring the expert's physical presence. As expected, this enabled participants to disagree easier with expert opinions. In the Austrian context, where hierarchies between lay-people and experts are deeply culturally entrenched and members of the public rarely challenge experts in direct face-to-face encounters (Felt et al., 2009a), our methods created a space in which criticism of expertise and experts became possible.

Third, the setting's choreography aimed at alternating individual engagement phases (choosing cards) and group discussion phases as a recurring pattern of the workshop. Thus, when entering a new round of choosing cards, participants could take breaks from the quite demanding situations of interactive discussion. These moments allowed for both repositioning one's personal standpoints in the light of what has been discussed as well as anticipating the upcoming debate. As mentioned above, the participants applied different rationales here: Some used individual phases to evaluate and assure the coherency of own positions while others attached importance to the overall process so that no issues were missing out and arguments were balanced.

Projective and retrospective imagination

In this final section, we reflect on how the central idea behind our *technology of imagination* worked out, which was to stimulate people's capacity to imagine what the development of nano-technology in specific areas of social life could mean for them as individuals but also for the future of society as a whole. As pointed out by a number of authors (Brown and Michael, 2003; Adams and Grove, 2007), past experiences and future expectations have to be understood as deeply entangled. In this regard, it is crucial to understand how participants connected retrospective and prospective imagination throughout the stages of the discussion process, in particular since each stage enabled them to perform this differently due to the changing focus of perspective.

As stated before, in the first stage, the cards captured statements from contemporary actors. We observed participants' efforts to associate these stories to their individual as well as to collectively shared past experiences in order to develop a position towards potential futures. For instance, referring to the anti-nuclear protest movements of the 1970ies, it's critique of a non-reflexive idea of progress, and the experience that people can refuse certain technologies, helped them to make sense of an unfamiliar phenomenon and hence assisted their projection work.

The application cards introduced afterwards were intended to open up different temporal horizons by presenting already existing as well as more speculative applications. During this phase we witnessed that more futuristic visions of nano applications were not taken up as an issue to be collectively discussed. This was especially the case in one workshop where, although four out of the six participants picked one particular application card, it was not taken up in the following debate. The card depicted a more speculative vision of a so-called nano louse, a tiny robot able to autonomously repair

the human body. While visually appealing, participants could not connect these abstract visions to their past and everyday life experiences. Thus, these visions were excluded from discourse reflecting the general observation that most participants were either reluctant or unable to imagine and discuss speculative applications linked to dystopian or utopian futures.

Subsequently, it was the aim of the issue cards stage to introduce both pre-existing issues and concerns of technoscientific developments in general as well as new issues nano could raise. Here, the participants were particularly attracted to 'older' ethical, social and legal issues such as distribution, discrimination, responsibility or product labeling, since these were seen as relevant for any technological innovation be it in the past, present or future. Thus, discussing nano turned out as a chance to reactivate debate about wider societal questions and the relationship of technology and society. Yet at the same time, every new technology coins its specific issues, in the nano case these were particularly linked to invisibility and smallness, which were considered to be problematic in many respects (e.g. smallness as means to transgress body boundaries such as skin or an unrecognized 'creeping in' society of nano).

In the last stage the process of imagining and expressing what futures might emerge was put at the centre. At this point, participants were explicitly encouraged to engage in projecting current socio-technical developments into the future and build their own scenarios. At the beginning of the workshop, citizens were relatively unfamiliar with the to-be debated issue, but assisted by the cards they worked their way through the four-hour debate, formulating their own positions and envisioning their own future scenarios. Over the course of the workshops, they turned from feeling unable to talk about nano to citizens having acquired expertise in debating the issue and even projecting it into the future. This transformation process is not only evident in their own astonishment (see epigraph), but also showed itself in the diverse narratives they constructed in the future card discussion phase where they tried to extrapolate certain developments into the future. Hence, our *technology of imagination* created citizens that perceived themselves as experts for imagining how a specific technology might develop in a certain cultural context.

4. Conclusions

It was the main goal of this paper to present and reflect upon the development of the card-based engagement method IMAGINE, and to analyze how participants appropriated this *technology of imagination* through their discursive and material practises. Following an inscription/description approach, we offered insights into how users de-scribed the method's script by adapting, subverting or complying to it. In this concluding section we now want to reflect further on the possibilities and limitations of IMAGINE as a way of creating a public engagement setting as well as a qualitative research method.

Starting with the limitations and how to deal with them, we focus on four aspects: First, it has to be kept in mind that using cards in general brings with it specific framings and vocabulary. As a consequence, social scientists working with this method need to carry out a sound analysis of the field in advance of writing the cards and thereby carefully balancing different views and positions. Second, since the materiality

of the cards turned out to be an important feature of the setting, we would suggest to complement audio with video recording to better capture the non-verbal strategies of handling the cards. Third, even though we sought to foster symmetry among the different participants, we observed that those who linked the debated issue with a clear personal agenda definitely proved more successful in sustaining their position. Fourth, as our four-hour discussion workshops represent a one-time engagement we can only speculate about the effects of the debate beyond this concrete setting. To counteract these last two shortcomings, we recommend carrying out follow-up interviews with selected participants as a means of capturing the impact of such an engagement exercise as well as of investigating if and how positions have shifted over time. Our experience with such interviews shows that they might also bear the opportunity to explore in more detail those individual positions that remained marginal in discussion group settings for diverse reasons. Hence, such interviews represent an ex-post strategy to bring back less visible positions into the analysis and to rebalance the individual and collective positioning work.

Turning towards the method's potential, we want to stress that in absence of a public debate on nano IMAGINE allowed us to bring dispersed elements of public discourses and visions to the table. While participants accepted our invitation to work actively and creatively with the material and discursive elements we gave them, they also brought their own resources to the debate. Still, the cards provided a useful basis for articulating individual and shared memories by keeping different positions materially present. Analytically, this allows the moderator and the analysts to identify and inquire about non-chosen and non-debated issues. Such a research perspective helps to understand why certain issues manage to get attention and become a priority in public debates while others stay in the background or remain unaddressed.

Additionally, IMAGINE enables analysts to focus on both individual and collective positions and processes, since its choreography balances moments of individuality and collectivity. This was enabled through the four stages and the order of their phases, which provided time for introspection and individual decision-making (card reading and choice phases), subjective positionings (explaining card choices) and collectively negotiating cards and positions in the more inter-active discussion phases. In that sense, the intention was to rather design a process-oriented method that an output-oriented exercise. This reflected our assumption that people rarely possess already stabilised opinions on emerging technosciences, but rather need a space in which they can gradually creatively develop and test out arguments.

Moreover, the physical absence of experts enabled participants to focus more on their own capacities, knowledge and experiences. At the same time, the integration of expert voices in the cards allowed them to deal critically with the positions of these societal actors and use them creatively to support their own positions or to distance themselves from them. We argue that our *technology of imagination* actively contributes to create citizens' capacities to acquire broader imaginations with regard to the potential development of emerging technologies in a certain cultural context—and thus taking seriously citizens as potentially important players in the governance of these technologies. This was clearest in the final stage, where the group members saw themselves not only as competent enough to build their own future scenarios but also

played out their expertise by extrapolating certain developments, issues and problems into the future.

Although IMAGINE is deeply tied to its context of use, it is also an adaptive technology in the sense that it can be used for stimulating debates about other emerging technosciences or any not yet publicly debated issue. We want to encourage other qualitative researchers and designers of public engagement settings to adapt it to their needs and specific topics. Having said that, we want to stress that IMAGINE is not supposed to be a ready-made tool that can be simply transferred from one national or cultural context to another. It has been designed for the Austrian context which is characterized by a non-participatory technopolitical culture where public engagement plays hardly any role and where open critical debate on technosciences – with a few exceptions such as nuclear energy and genetically modified organisms – is hardly existing (Felt et al., 2008).

Finally, it is important to reflect the multiple roles of social scientists in designing engagement settings. As analysts, they play a key role in bringing a dispersed public debate to the table and translating it into the content of the cards. Yet, as this method focuses on the process and not so much the concrete outcomes of these settings, another layer of social science analysis is needed to turn such debates into something that can become relevant to policy making. In that sense social scientists not only act as *experts of community* (Rose, 1999), i.e. as performing publics in technoscientific debates (Felt and Fochler, 2010; Michael, 2009), but also as *experts of translation* who mediate between public discourse, public engagement settings and the policy arena.

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