

Intervention by Invitation: New Concerns and New Versions of the User in STS

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Over the past three decades, STS has increasingly moved from a position of often 'studying up' to a position of often 'being invited' into scientific, technological and political projects. As a consequence, more and more STS researchers now find themselves having access not only to the sites, but also at times to the discussions and the decisions. With these new points of entry, the key question about intervention may no longer be if STS will be heard, but rather how the contributions from STS will combine with those of other participants in joint projects. The article investigates how Danish STS researchers were invited to intervene under the auspices of a national programme to promote user-driven innovation, and how they gradually developed new versions of the well-established conceptions of the users known from the STS literature. The new versions of the user raised higher hopes about the innovative potential of users, and evoked deeper fears about elusive publics and disloyal customers. Finally, the article considers the peculiar 'middle management' position that STS researchers may hold as mediators between users and projects, and it proposes the term 'intervention-as-composition' to designate the type of intervention that may result from mediating between previously unconnected actors.

Keywords: intervention, user-driven innovation, participatory design

Introduction: From Studying up to Being Invited

When we think about the interventions made by STS researchers, we often worry about whether their analytical points will be heard. Will they be taken seriously? Will they manage to interfere, reflect, provoke or in some other way have an influence on subsequent practices?

This rather self-conscious, concerned and modest way of thinking about the effects of STS interventions may have many sources. But it certainly echoes the way in

which early STS researchers approached their objects of research in the late 1970s and '80s. Inspired by movements within anthropology to 'study up' – i.e., to focus on "the colonizers rather than the colonized" (Nader, 1972) – early studies of science and technology were deliberate attempts to shift attention to the Western techno-scientific elites (Latour & Woolgar, 1979; Knorr-Cetina, 1981; Lynch, 1985; Suchman 1987). With this choice of study object, STS researchers, inevitably and for very good reasons, depicted themselves as relatively small and powerless investigators of large, prestigious

and powerful techno-scientific enterprises. In these accounts, STS researchers were strangers with strange perspectives, who approached techno-science as visitors from the outside (Latour & Woolgar, 1979). They were invited to the *sites* of techno-science, such as laboratories, but they were nowhere near the crucial *discussions* or *decisions*. In fact, it was usually unclear whether the natural scientists and technologists would notice their work at all.

STS has now been around for three decades. The field has achieved a considerable academic success measured in terms of growth in publications, journals, conferences, professional organisations and graduate programmes, and there are several indications that 'coming from the outside' and 'studying up' are no longer the only things that STS does. One significant indication of the gradual shift in practice and self-depiction is a steady flow of concepts that emphasise the ways that STS researchers always necessarily influence their objects of study: We are in the belly of the monster (Haraway, 1991), reflexively implicated (Woolgar & Ashmore, 1988), entangled (Callon & Rabeharisoa, 2004), drawn into matters-of-concern (Latour, 2004a; 2005), and we are producing descriptions that participate in the performance of our research objects (Law, 2004). This growing sense of the inherently political, implicated and interventionist nature of STS seems to have developed in tandem with increasingly intense engagements between STS researchers and their objects of study. Gradually, unevenly and in many different ways, STS researchers have managed to become invited – or to invite themselves – further into technological and scientific activities as well as into public policy. They have, for instance, taken on roles as technology designers, market researchers, expert court witnesses (Woolgar, Coopmans & Neyland, 2009), public-engagement

consultants (Irwin, 2006), and research-policy advisors (Rip et al., 1995; Sørensen & Williams, 2002; Felt & Wynne, 2007). Where STS researchers were previously invited to the *sites*, they now, at least occasionally, engage in the *discussions* and the *decisions*.

With these new roles and activities, normative discussions about intervention sometimes erupt. Some STS researchers have argued that *the time has come* for STS to move away from merely descriptive analyses of technology, and towards active engagement and intervention (Berg, 1998; Guggenheim & Nowotny, 2003). Others have strongly rejected the dichotomy between description and intervention, and made the case that STS is already on the right track since it has *always* been intervening in one way or another – by offering different perspectives, by taking part in discussions, or merely by being at the sites (Zuiderent-Jerak & Bruun Jensen, 2007; Vikkelsø, 2007; Woolgar, Coopmans & Neyland, 2009).

Debates for or against intervention tend to be somewhat futile, since most people are in favour of intervention, or engagement, or of somehow making a difference in the world. A more productive approach is probably the one that the participants in these debates promote when they stress that STS is a “vast, complex, multidisciplinary enterprise” (Woolgar, Coopmans & Neyland, 2009: 21), which therefore leaves room for a variety of ideas and approaches; this again merits a closer analysis of how intervention actually happens in specific cases (Zuiderent-Jerak & Bruun Jensen, 2007). My intention in this paper is a similar turn to self-reflection through cases and specificities. I assume that much has happened from the time when STS researchers adopted the role of studying up until now, when they are being invited to participate in the development of technology and in the formulation of new policy agendas. More specifically, I assume that when intervention happens

by invitation, the question is no longer *if* STS will be heard at all; of course it will. The questions are *what* STS researchers will bring to the table, *how* their contributions will enter joint processes of development, and what *results* will emerge; I call these results *compositionist effects* to stress that they arise from the combined efforts of STS researchers and others. I also use the term ‘compositionist’ to indicate an affiliation with STS scholar Bruno Latour’s recent attempt to formulate a so-called Compositionist Manifesto (Latour, 2010). Latour argues for a reorientation of social science, in the sense that ‘we’ should forgo our ambitions to critique others by revealing some sort of underlying logic; instead, the role of the social sciences should be to engage in the composition of a common world. I share his fascination with difficult collective negotiation processes in situations where no recourse can be made to external essentials, such as the ‘real’ needs of the ‘actual’ users ‘out there’, and I am also largely sympathetic to Latour’s programmatic compositionist visions. The concern of this paper, however, is first and foremost empirical. Therefore, I do not discuss Latour’s manifesto in any more detail here see Law, 2009 and Munk & Abrahamsson, 2012 for further discussion).

The particular invitation that I explore in this paper could be described as a rather spectacular one. It came in the form of a recent Danish innovation policy focusing on ‘user-driven innovation’ (UDI). The policy was officially announced in 2006 by the Danish Minister for Economic and Business Affairs in a speech to an audience of industrialists, consultants and a few senior ethnographers (Halse, 2008: 185). The Minister said that he hoped “that user-driven innovation would be one of Denmark’s major competitive advantages in the future”, and that “anthropologists and sociologists could contribute with a new understanding of users’ unacknowledged

needs and preferences”; this understanding, in combination with the existing knowledge of designers, engineers and marketing experts, could result in “successful new innovations” (Bendtsen, 2006).

In the months that followed, the Ministry for Economic and Business Affairs and the Ministry for Science, Innovation and Higher Education established two funding programmes. Both programmes related directly to a well-established STS topic (the understanding of users), they invited social scientists to play a crucial role, and they provided a substantial amount of funding (€55 million) for a broad range of projects. The resulting stream of projects, being conducted between 2007 and 2014, provided an invitation to conduct various sorts of cultural analyses; in addition, the projects created obligations to connect with the agendas of various other actors, including private companies and national policy makers. Thus, the Danish UDI programmes generated a rich field in which to explore how STS researchers are invited to intervene; it was an occasion not just to interfere from the sidelines with other more powerful actors, but to participate more directly in the joint development of ideas, projects and agendas.

Empirical Material and Outline of the Paper

It should be clear from the outset that my exploration of STS interventions in Denmark is, by necessity, a situated one. Like everybody else, I find myself equipped with certain resources and located within certain networks. First of all, I define myself as an STS researcher; I have participated in STS discussions about users and technology, which means I should potentially be in the group of Danish social scientists to whom the Minister’s invitation was extended. Second, I have colleagues

and acquaintances who are consultants and university-level researchers in Denmark – many of them have participated in user-driven innovation projects since 2007. Through this association, I have engaged in a number of discussions, arranged seminars and listened to many stories about UDI projects. And since 2008, I have been a member of a research coalition, now called TempoS, that received funding from one of the programmes in 2010. The TempoS coalition consists of three STS-inspired research groups from the Technical University of Denmark (DTU), the University of Copenhagen (Ethnology), and the Danish Design School. Each of these research groups had previously participated in a UDI project. Thus, my current colleagues (in TempoS) had been participants in three earlier projects that were funded by the UDI programmes. For me, this has turned into an empirical opportunity, since my colleagues have granted me access to their previous work, experiences and reflections. The empirical material for this paper consists of all the texts from the three projects that are publicly available (e.g., project descriptions, reports, articles) as well as a number of unpublished documents (e.g., preliminary papers, notes on the project's status). I also draw upon group interviews with the participants in each project.¹ Finally, I build my analysis using a number of policy papers and reports that were produced by various Danish Ministries and public authorities.

The practical life of collaborative research projects is a complicated affair, and therefore the 'invited interventions' that took place in the UDI projects might be analysed from a variety of different angles. I have chosen to use conceptualisations of the user as my analytical lens because both STS researchers and the initiators of the UDI programmes have a significant investment in the user. In STS, an elaborate discussion about the user has been taking place since

the 1980s; in the UDI programmes, a better understanding of users was defined as *the* crucial way to stimulate innovation.

The outline of this paper is as follows: First, I discuss various ideas about 'the user' that are espoused or implied by the Danish user-driven innovation programmes. Here, I draw upon a number of official documents from the Ministries and public authorities. Second, I review some key discussions on the concept of 'the user' in STS; knowledge of these discussions is what STS researchers might bring to the table, so to speak. Third, I explore the theoretical and practical handling of 'the user' in the three earlier UDI projects. All three projects utilise established conceptions of 'the user' in STS; however, as part of their engagement in collaborative project work, they also re-configure earlier conceptualisations of the user in interesting ways. Finally, I discuss the more or less new versions of 'the user' that emerge; i.e., the compositional effects that may follow when STS researchers engage in this kind of invitation.

Conceptions of the User in the Danish User-driven Innovation Programmes

The user-driven innovation programmes established by the Ministries of Economic and Business Affairs and Science, Innovation and Higher Education were established through a process that lasted at least four years. The publicly available textual traces of this process are: (1) a number of reports and analyses produced by the Ministry of Economic and Business Affairs from 2003 onwards; (2) a speech given by the Minister in 2006; and (3) the material produced by both Ministries in 2007 to guide applicants for funding. Within this material, at least three distinct conceptions of 'the user' can be identified. The first, which I call 'the user with unacknowledged needs', was established early and forcefully by

the Ministry of Economic and Business Affairs. Later, the same ministry added another conception, 'the lead user,' to which the Ministry attached somewhat less significance. Finally, the Ministry of Science, Innovation and Higher Education articulated the notion of 'the participating user.' At the time when the two funding programmes were established, both Ministries indicated that they were interested in all three versions of the user. In the following, I provide a brief outline of each of these conceptions.

The idea of *the user with unacknowledged needs* emerged along with the proposal of a Danish user-driven innovation programme; this occurred in a series of reports and analyses produced by a highly influential unit for business-policy analysis (FORA) within the Ministry of Economic and Business Affairs. In these reports, the issue at stake was what the national government should do to enhance the competitiveness and innovativeness of Danish businesses in the global marketplace. Addressing this overall concern, FORA made a case for user-driven innovation in the following way: First, FORA defined 'user-driven innovation' as one of three distinct forms or sources of innovation (Rosted, 2003); innovation, it was argued, may be either price-driven (competing for low costs), technology-driven (competing for new technological breakthroughs) or user-driven. Although in principle Denmark might pursue any or all of these sources of innovation, FORA argued that, in practice, we could not. Due to high Danish wage levels, we cannot compete on price, and due to Denmark's limited size, we can rarely afford the investments necessary to make technological breakthroughs. This left only the third possibility: to compete for an in-depth and up-to-date understanding of users' needs. With this argument in place, FORA turned to international case studies of the fashion, medical and electronic

industries (Jørgensen et al., 2005; Riis, 2005; Høgenhaven, 2005). After examining a number of cases, mainly from North America, FORA suggested that leading companies have developed the capacity to systematically investigate users' needs, and to relate this knowledge to product development. The key to this capacity is the application of anthropological expertise and methods. The third and final part of FORA's argument returned to the business conditions in Denmark. Based on a survey, FORA argued that the higher-education system in Denmark provides companies with plenty of candidates who have technical qualifications (e.g., engineers), but very few candidates are qualified to systematically investigate users' acknowledged and unacknowledged needs. For this reason, FORA drew the conclusion that the Minister would later publicly declare: A concerted national effort was needed to develop research and education in user-driven innovation (Rosted, 2005). This brief account shows that 'the user with unacknowledged needs' is a crucial element in a very specific string of arguments: If Denmark wants to strengthen its national competitiveness, we must attain a better understanding of the user's needs, which is only possible by utilising social-scientific expertise; this again makes it necessary to establish an ambitious UDI programme. The unacknowledged needs of the user were thus depicted as something lying out there as an underground resource that could be harnessed by a sufficiently determined nation.

The predominant focus of the FORA report (Rosted, 2005) was on 'the user with unacknowledged needs.' However, the report also introduced a second version of the user that had not been mentioned in previous reports: *the lead user*. The concept of the lead user was originally developed by innovation economist and MIT professor

Eric Von Hippel (1976; 2005), who the leader of FORA had met earlier on a study visit to the U.S. In his work, Von Hippel argues that certain groups of users have needs that are so far ahead of the market that no commercial product will fulfil them. This could be the case for computer-game enthusiasts, for instance, who need particularly fast graphics. Users with such needs tend to have a strong incentive to innovate for themselves: They may tinker with existing products; they may develop entirely new ones; and they may discuss and develop their ideas in collaboration with other users who have similar needs. Von Hippel cites a number of cases where lead users developed artefacts that later turned into commercially successful products. Von Hippel also developed a number of methods for businesses that want to 'tap into' the creativity of lead users (von Hippel et al., 1999). As mentioned, the Ministry of Economic and Business Affairs adopted the notion of the 'lead user' as part of what they meant by user-driven innovation. However, the Ministry did not share Von Hippel's interest in the conditions under which certain users, such as open-source programmers, can develop and distribute solutions for free, fully independent of commercial interests (i.e., so-called 'user innovation'). Instead, the Ministry only emphasised the commercial potential in harnessing the creative potential of lead users.

In both versions of the user mentioned so far, the user is depicted as a source (of unacknowledged needs, of homemade innovations) that companies may learn to take advantage of. The user is thus cast in a relatively passive role compared to actors in government and business. But this imagery changes significantly with the third version of the user, *the participating user*, which began to appear in the policy papers of the Ministry of Science, Innovation and

Higher Education in 2006 (Forsknings- og Innovationsstyrelsen 2006). The ministry makes reference to the so-called Scandinavian tradition for participatory design (Asaro, 2000). This approach originated in the 1970s, and was born from the ongoing struggles and negotiations between trade unions and industrial firms over the introduction of new technology. In a number of projects, dialogues were established between workers and technology designers, the workers' knowledge of existing processes was communicated to the designers, and attempts were made by the union representatives to avoid deskilling and an intensification of labour. Later, participatory design has come to signify the active involvement of users in the design phase, and the approach has become fairly well-known as a developmental strategy, particularly in the field of information and communication technology (ICT). Essentially, the conception of the participating user builds on a normative political idea that users should be involved in the development of technologies that will change their workplaces, combined with the belief that collaborative design processes will lead to better technologies that are more easily adopted.

With the formulations of the user with unacknowledged needs, the lead user, and the participating user, the two Ministries initiated a user-driven innovation effort that drew upon very different sources of inspiration, entailed different assumptions about users' capabilities, and implied different roles for businesses and social scientists. Even though the Boards of two funding bodies had to approve applications before any support was given, the social scientists, including the STS researchers, were justified in believing that a certain degree of openness was included in the invitation. In the following, I consider some conceptions of the user that STS

researchers might bring into joint user-driven innovation projects.

Conceptions of the User in STS

STS has taken a keen interest in the users of technology since at least the 1980s. A large number of case studies have examined users, their roles, their actions, and their sense-making – both in processes of technology design and development, and in processes of implementation and appropriation. In the following, I introduce three key conceptualisations of the user in STS².

The first is a conception that I call *the pragmatist view of the user*, which was developed by Lucy Suchman in *Plans and Situated Actions* (1987). This book can be seen as the result of a conflict between two entirely different views of human practice; Suchman originally trained as an anthropologist and had also taken an interest in ethnomethodology (cf. Garfinkel, 1967). Consequently, she views human action as a materially and socially embedded process that unfolds through concerted moment-to-moment efforts to maintain the coherence, meaningfulness, and mutual intelligibility of actions. At the time, this view was in stark contrast to the view held by artificial-intelligence researchers, which focused on cognition; specifically, that human actions are governed by mental programmes. In her book, Suchman exposes the inadequacy of the cognitivist view through a fine-grained analysis of how the plans and instructions offered by an ‘intelligent’ photocopier machine always have to be interpreted by human actors in the context of their specific social and physical circumstances.

With the work of Suchman and her fellow anthropologists at Xerox (Suchman & Trigg, 1991; Blomberg et al., 1993) – and more broadly with the work of like-minded American pragmatists (e.g., Star & Strauss,

1999; Agre, 1995; Bowker & Star, 2000) – a new agenda for STS emerged: If the situated actions of users constitute an irreducible complexity around any technology, and if there can be “no a priori or algorithmic connection between any particular plan and any specific action” (Robinson quoted in Berg, 1998: 461), then there is potentially much to be gained by describing the situated actions of users. The gains may take immediately practical forms, such as the discovery of the situated, interactional sources of dysfunctional communication between humans and technology. This sort of attention to interactional detail has given impetus to the field of Computer Supported Cooperative Work (CSCW). But STS researchers, particularly Susan Leigh Star, have also emphasised the political importance of describing the actions of users (Star & Strauss, 1999; Bowker & Star, 2000): If so-called ‘low-skilled’ work, such as clerical work, in practice consists of complex moment-to-moment interpretations and sense-making, then STS researchers might contribute to the valorisation of this work by more carefully describing it. Moreover, STS researchers might counteract ‘management engineering’ attempts to plan, structure, control or computerise this work. Such counteracting may be very important for the simple reason that designers of new technologies often work in Research & Development labs that are institutionally removed from – and thus ignorant of – the work practices that new technologies may interfere with (Agre, 1995). Following the attention to and sympathy for workers ‘on the ground’, many STS researchers formed alliances with the Scandinavian tradition of participatory design (Ehn & Kyng, 1987; Bødker, 1996); this tradition very overtly attempts to forge alliances with designers in order to ensure that workers’ experiences, knowledge and interests are taken into account when new technologies are

designed and implemented. Proponents of the pragmatic or situated view of the user have thus made an effort to relate their conception of the user to the practical design of new systems and technologies. They have, in the terminology of this article, attempted to invite themselves in.

A second conceptualisation of the user is found in a range of analyses of the *socio-historical construction of technology*. Historians of technology have developed rich case studies in which they emphasise the importance of historical circumstances and key actors during the events that configured and stabilised technologies into their more durable successive forms. Prominent examples include studies of electricity (Hughes, 1983), industrial automation (Noble, 1984), household technologies (Schwartz Cowan, 1985), the telephone (Fischer, 1994), and the rural automobile (Kline & Pinch, 1996). Within STS, the most formulaic expression of this approach is undoubtedly the so-called Social Construction of Technology (SCOT), which was developed in the 1980s and '90s (Pinch & Bijker, 1984; Bijker, 1997).

As its point of departure, SCOT criticises the view that 'the technological' comes to society in a relatively finished form and later achieves its impact. Instead, SCOT emphasises the ongoing social struggle from which technologies emerge; different social groups interpret the same technology differently ('interpretative flexibility'), and certain designs of the technology may more or less cater to the interests of certain groups of users. Therefore, users engage in various forms of advocacy for particular versions of a technology, and users may be subject to exclusion or a pressure to conform to technologies that reflect the interests of social groups other than their own (Oudshoorn & Pinch, 2003; Oudshoorn et al., 2004; Rohracher, 2005). SCOT's conception of the user as part of a social group and as a

participant in a wider social struggle around technologies is decidedly broad. Several critics have thus argued that SCOT paints too broad a stroke, which leads to a rather reified notion of social groups and their interests (e.g., Pfaffenberger, 1992; Grint & Woolgar, 1997; Hyysalo, 2010). Although this may be true, it is also undeniable that SCOT has contributed to a significant expansion of the range and types of processes that STS researchers consider when they talk about users and technologies. The socio-historical approach to the analysis of technology (of which SCOT is but one example) continues to generate elaborate longitudinal case studies. Recent examples include the so-called 'biographic' approach (Williams & Pollock, 2008; Hyysalo, 2010), in which a series of interrelated projects is examined in order to capture the complex relationship between users, designers and product development.

The third distinct conceptualisation of the user is found in a cluster of work that may be called *material-semiotic approaches* (Woolgar, 1991; Latour, 1987; Akrich, 1992; Latour, 1992). This line of work is similar to the pragmatist conception of the user, in the sense that it develops relatively fine-grained analyses of users' practices. The difference, however, is that material-semiotic approaches make no a priori assumptions about the nature or the competences of the user. Thus, Woolgar (1991) describes how the process of developing a new technology – specifically, a microcomputer – also entails configuring the user; through usability trials, the designers define the identity of putative future users and set constraints on their actions. Woolgar argues that the machine, therefore, is much like a text; its meaning only emerges through its relationship with its readers and with the establishment of particular 'readings'. With a somewhat similar use of a textual metaphor, Akrich (1992) coins the term 'in-

scription' to denote the process by which designers build their assumptions about the world and users' actions into the technical content of an artefact. Furthermore, she proposes the term 'de-scription' to denote subsequent events where humans and non-humans react to what has been prescribed to them. In the same vein, Latour (1992) radically proposes to eliminate the entrenched dualism between humans and technology by substituting the terms 'program'/'anti-program'. A program is an association of human and non-human elements that attempts to order the world in one particular way. An anti-program is another association of human and non-human elements that counters the first program. Programs and anti-programs may each gain or lose elements, or they may be reordered in various ways. What remains, however, is that any doing, use or practice is the result of a heterogeneous association of elements; thus, the world cannot be easily divided into social and technical elements. As a consequence, the 'user' in this conceptualisation is no longer merely a human being or a social category; it is the effect of a materially heterogeneous actor-network. This post-human approach has not led to a loss of interest in the user, as one might perhaps expect. Rather, the material-semiotic approaches (including actor-network theory) have inspired a range of 'thick descriptions' of how users are 'enacted' in practice (e.g., Law, 2002; Mol, 2002; Helgesson & Kjellberg, 2006; Konrad, 2008).

STS Researchers in the UDI Programmes – Three Cases of Intervention by Invitation

In the previous two sections, I presented the UDI programmes and the STS literature as two separate sides that meet. By choosing this mode of presentation

– which by necessity de-emphasises any historical interconnection between the two sides – I have attempted to focus on the pragmatic situation at hand: STS-inspired researchers in the present responding to a specific invitation. In this situation, they are presented with a series of possible projects. Projects that could attempt to uncover the unacknowledged needs of users, projects that could attempt to tap into the innovativeness of lead users, or projects that could attempt to engage users as participants in jointly developed projects. In their engagement with one or more of the possible projects, the invited researchers may draw upon theoretical vocabularies and empirical styles from the STS literature, including the pragmatist view of moment-to-moment situated interaction, the study of broader social groups over longer stretches of time, and a material-semiotic approach that deliberately blurs the boundaries between humans and technology.

In the following, I look at three projects that combined elements from each side. Certain types of user-driven innovation projects were chosen, and certain STS-inspired conceptions of the user were brought to the table. In each case, I trace how these various elements were combined, and how new versions of the user emerged.

Project 1: Interactive Grocery Shopping of the Future (IGSF)

As opposed to several other European countries, Internet-based grocery shopping has been a relatively rare and fairly unsuccessful business model in Denmark. However, the project called 'Interactive Grocery Shopping of the Future' (IGSF) proposed to change this situation through a series of activities that would "map the consumers' acknowledged and unacknowledged needs, in order to develop a virtual supermarket. The aim [was] to deliver knowledge about the users'

needs, which [would] help the traditional grocery shopping sector to take the leap to the Internet with greater certainty and greater success” (quoted from the project description).

The project idea – with its clear reference to the ‘uncover the needs’ type of UDI project – was developed by the *Institute for Future Studies*, a private think tank and consultancy firm based in Copenhagen. The Institute invited three other parties into the coalition: *Coop*, the largest Danish supermarket chain; *Art of Crime*, a small consultancy company that works with computer games; and a group of ethnologists from the *Center for Cultural Analysis* at the University of Copenhagen. The ethnologists, led by Tine Damsholt and Astrid Jespersen, were the partner-group that brought STS perspectives into the project, and it is their contribution that I focus on here.

To understand the ethnologists’ role, it is important to note that the project was organised into a number of relatively independent phases. The partners communicated intermittently, and hand-over sessions were organised between phases, but the majority of the work was conducted within the phases and under the direction of just one of the partners. According to the project plan, the ethnologists would first be responsible for a study of current users’ practices. Second, the Institute for Future Studies would use this research as a springboard for developing future scenarios. And third, Art of Crime would develop various ‘storyboards’ for Internet-based solutions.

In planning ‘their’ phase of the project, the ethnologists drew upon their previous expertise in the cultural analysis of everyday material practices. These practice studies were partially inspired by other STS analyses of user practices (e.g., Mol, 2002; Shove et al., 2007). However, the ethnologists’ definition of ‘practice’ was not particularly

compatible with the goal of ‘uncovering unacknowledged needs’ that the Institute of Future Studies had written into the project application. Therefore, when they planned their phase of the project, the ethnologists made some careful reformulations. The idea of uncovering needs was replaced with an intention to study *heterogeneous practices*. These were defined as an interlinked set of practices connected to meals and grocery shopping within the context of an individual household. In this way, the ethnologists broadened the application’s initial conception of the user, which focused exclusively on the activities within the supermarket.

From this starting point, the ethnologists conducted a qualitative study of the meal-preparation and grocery-shopping practices of 36 households in total (Jespersen et al., 2010). The study included traditional research methods, such as interviews, observations, and gathering relevant texts and images. More experimental methods were also employed: The ethnologists developed a ‘design game’ – a set of questions and cards – that was used to engage family members in a joint reflection on how they plan, shop and prepare meals for various occasions (Jespersen et al., 2010: 14). The ethnologists also followed and interviewed users while shopping in a supermarket or on the Internet (Jespersen & Breddam, 2010).

The analysis and presentation of the empirical material is indicative of the distinct notion of the user that the ethnologists developed or espoused in their phase of the project. In this material, the ethnologists identified seven so-called *rationalities*: economy, time, logistics, morality, the social, health, and experience/pleasure. These rationalities refer to “logics, strategies and arguments, as well as specific doings and material elements in shopping practice” (Jespersen et al., 2010: 6-7). The ethnologists

strongly emphasised that rationalities must be seen as relatively stable patterns of practice that individuals enact or relate to. The list of rationalities is thus not a typology of individuals or their 'needs,' but rather an analytical tool for describing the durable patterns of practice. With the conception of these rationalities, the ethnologists clearly took a step away from the proposal, in which the project sought to uncover the *needs* of customers. It could be argued, however, that the ethnologists still worked within the overall framework of the project, in the sense that they delivered empirically-based knowledge about users for the specific purpose of informing the designers of new virtual supermarkets. To further stimulate this aim, the ethnologists formulated four themes that they would advise designers to contemplate when designing a new online platform. The themes were: space and physical set-up, sensory landscapes and choice situations, hybrid practices (i.e., how consumers do many things simultaneously when shopping), and active products (i.e., how buying certain products entail an engagement with other projects).

At the end of their project phase, the ethnologists put their empirical material through a process they referred to as 'packaging': A so-called portfolio was made for each rationality or theme containing first a more conceptual description of the rationality/theme, and second a list of illustrative quotations, images and examples. The format of the packaging reflected the ethnologists' ideas about how their study of users should be utilised. They wanted the empirical material to be accessible and usable for a variety of purposes in the subsequent phases; hence, the lists of quotations and illustrations. But the ethnologists also wanted to maintain that the patterns of practice related to meals and shopping were relatively stable over a 10-year period. For this reason, they

delivered a list of relatively fixed rationalities that they wanted the other participants to adopt. The themes fell somewhere in the middle: They were intended as strong recommendations for future work, but not as an all-encompassing list of issues.

During the subsequent phases of the project, the ethnologists realised that their packaging did not work quite as well as expected. The Institute for Future Studies and Art of Crime developed scenarios and software concepts that were, in the ethnologists' estimation, only tangentially related to the first phase of the project. When interviewed, the ethnologists expressed more confidence that Coop understood and appreciated their materials. However, since Coop has yet to develop any specific concepts or platforms, it is unclear whether this more positive expectation will hold up.

Discussion on Project 1:

The account given here of the IGSF project makes it clear that different notions of the user cannot be mixed and matched in a straightforward way. A too hasty and rather cynical conclusion would be that the ethnologists insulated themselves, did their 'normal' type of practice study, and were then ignored by the other groups. However, this would overlook a subtler shift in the role assumed by the STS participants. Although the ethnologists had issues with the *specific* scenario approach to future studies that was championed by some of the other participants, the ethnologists did actively engage in the project of constructing a future Internet solution by outlining rationalities and themes that could inform designers. The ethnologists' studies of consumers' situated actions were thus not framed as an exploratory or critical investigation of current practices; they were framed as a contribution to the imagining of a technological system that would exist well into the future. One could say that the

ethnologists studied tangible practices with a rather intangible purpose. This future-oriented approach is in contrast to most of the user studies within STS. There are plenty of studies of technology in the making (e.g., Latour, 1987) or about technologies in current use (e.g., Oudshoorn & Pinch, 2003). There are also some studies of practices that *are about* to be changed by new technology (Suchman, 2003: 3). But there are very few STS projects that relate user studies to a technological system that may or may not be realised at some unspecified point in the future. This, I suggest, is where the unique ‘compositionist’ effect of the project lies. By accepting an invitation to participate in a project about the Internet-based grocery shopping *of the future*, the ethnologists accepted a challenge to forge some sort of ‘unusually long’ link between their studies of current practices and a future activity. Although the success of this connection is uncertain, it appears that their engagement with the project prompted the ethnologists to invent a slightly different version of user studies: More emphasis was put on the stable aspects of practice (i.e., rationalities) that would presumably last into the future, and the researchers take on a new role of highlighting issues (i.e., themes) that the designers would have to consider.

Project 2: Textile Qualities

The ‘Textile Qualities’ project was inspired by two problems: First, Danish design schools needed to create a research base as part of their transition to attaining university status; and second, Danish textile companies were under extreme pressure to compete in the global market. With the development of the UDI programmes, a researcher at Kolding Design School and a researcher at the Technical University of Denmark (DTU) developed the idea that UDI methods might open up an important new field for the design schools. They also

imagined that UDI methods could be used to generate a new platform for innovation for textile companies, since these businesses would normally think of ‘innovation’ as the addition of technological content or new graphic designs.

A project coalition was formed, which consisted of participants from DTU, two Danish design schools, and two design companies. The project description (Jørgensen & Munch, 2007) was developed together with the coalition and addressed several UDI topics, but it mostly related to the ‘participatory design’ type of project; the aim was “to develop knowledge and test methods for involving users and user insights into the development of new textile qualities and products” (Jørgensen & Munch, 2007: 6).

STS perspectives and researchers had a very prominent role in the Textile Qualities project from the very beginning. One of the initiators, Ulrik Jørgensen from DTU (who eventually became the project leader), had worked for a number of years with STS and user studies, particularly SCOT and actor-network theory. Similar interests were shared by the other researchers and research assistants from DTU who were brought into the project. The ‘compositional experimentation’ between STS and other perspectives thus mostly happened between the researchers and other participants in the project, rather than within the group of researchers.

In the following, I focus on a major sub-project – informally known as ‘the hospital project’ – that was led by the group of DTU researchers, but which also included a range of other participants. The aim of the hospital project was to create closer communication between a particular textile company and some of its most frequent users in public hospitals. This communication would focus on the actual use and experience of textiles in hospitals; it would include

patients as well as hospital professionals; it would engage architects, designers and others who were assumed to play important roles as 'mediators and translators of user needs'; and the communication network would be extended all the way to the textile designers in the company. From the outset, it was clear that the *general* ambition was to create better communication. However, a range of more specific questions were quite open-ended: It was not clear which users, professionals or mediators to engage, how to engage them, or how to 'translate' their experiences into ideas for novel textiles. In fact, the STS participants described the handling of these questions as an ongoing struggle throughout the project.

In the early stages, the STS participants intended to employ a combination of: (1) ethnographic observations of hospitals and laundries; and (2) workshops with patients, nurses, architects and others, with a goal to develop ideas. These two elements roughly corresponded to: (1) a strategy of user-centred design by the discovery of new ethnographic knowledge about users' practices; and (2) a strategy of participatory design by engaging users more directly in design discussions.

However, it quickly turned out that the participatory design strategy was somewhat difficult to perform, since only a small group of nurses and a few patients could be persuaded to participate in the workshops. It was comparatively easier to conduct interviews and ethnographic observations, although the complexity of the hospital environment exceeded expectations. As a consequence, the ethnographic work extended over a one-year period, generating a large number of interviews, observations, field notes and photographs (Lindegard & Okholm, 2009). During the same period, three workshops were held with nurses and patients; however, due to limited participation, these workshops did not

produce a significant amount of new ideas. The project manager was feeling pressure to deliver the promised communication and inspiration to the textile designers, so an effort was launched to analyse the ethnographic material and turn it into product ideas. This work was primarily done by two STS researchers at DTU, who generated an 'idea catalogue' containing 10 'possible textile concepts' (Jørgensen & Lindegard, 2010). Each concept was presented with a sketch drawing that placed it in the context of a particular room of the hospital. In addition, it was illustrated with quotations from users or other sources that would indicate its relevance. For example, there was a sketch of a ceiling decoration that has aesthetic as well as sound-absorbing qualities. In the catalogue, this idea is followed by a brief narrative account from a patient who had trouble resting, a quote from a nurse explaining the relationship between rest and proper healing, and a photograph of the ceiling's dull look that the patients normally view from their beds (Jørgensen & Lindegard, 2010: 5).

The idea catalogue could be seen as a preliminary attempt to forge a connection between user experiences and textile designers. It was produced in a situation where the 'articulation' of users had not yet happened to its full extent. The catalogue was also intended to be an inspiration for the further development of ideas within the workshops - when or if the relevant participants could be assembled.

As the hospital project moved along, a number of additional workshops were held. However, it was a continual challenge for the project manager to convince various groups to participate. The architects, who play a significant role in the design of new hospitals, were particularly difficult to engage. But from the project manager's perspective, it was even more disappointing that the designers from the textile company needed to be persuaded to participate and

reminded of their obligations as official partners in the project.

Discussion on Project 2:

Strictly speaking, the STS researchers were not invited into the textile project – rather, *they* initiated the project, *they* formulated its participatory design ambitions, and *they* defined a very active and coordinating role for themselves. As I have indicated, the project employed a well-established user-centred design strategy of investigating user practices in order to inspire new concepts; this was epitomised by the idea catalogue. Meanwhile, the project also had the ‘participatory’ ambition of somehow setting up a communication network – an audience or a public who the designers could respond to and draw ideas from. It is this difficult task that made the STS researchers explore the hospitals’ complex inner workings, and attempt to engage key actors in the design workshops. It is interesting to compare participatory activities in the hospital project to previous STS work. One point of comparison is the participatory design projects of the 1970s and ’80s, with their focus on workers and the implementation of new technology. Compared to this, the orientation of the hospital project was towards a broader range of actors, and its focus was on possible new concepts and innovations, rather than on more specific planned changes. Another point of comparison might be the relatively recent work of Latour, Callon and others who have argued that STS should take on the role of assembling ‘hybrid forums’ or ‘parliaments of things’ that could address techno-scientific issues and controversies that are too complicated to be properly managed within existing democratic institutions (Callon et al., 2001; Latour, 2004b; 2005). But where Latour and Callon would ‘assemble’ to bring the sciences into democracy – thus implying that broad, heterogeneous public

controversies are somehow a democratic good in and of themselves – then the purpose of assembly and articulation in the hospital project was to help a textile company become more innovative through better communication with its actual, intermediary and potential users. The experiment with the hospital project – that is, the novel effect that the STS researchers attempted to compose in their collaboration with all the other participants – is thus an ‘innovative public’ specifically related to a company. Ideally, the designers would have received valuable information and ideas from this public, and would subsequently respond by designing textile products that take the public’s practices into account. The STS researchers’ declared ambition was to create participatory design, but one might just as well describe their activities as *the design of participation*. Thus, I suggest that the most novel attempt in the hospital project was to build a participatory design network for the purpose of industrial product development.

Project 3: The Design Anthropological Innovation Model (DAIM)

In a situation with ecological crises that are fuelled by growing amounts of waste, the goal of the DAIM project was to contribute to the development of a waste-handling system for the future by engaging citizens in waste reduction and recycling. To pursue this aim, citizens and waste professionals would be involved in various participatory design activities that would generate viable new solutions.

The project was managed by a group of STS-inspired researchers at the Danish Design School, who initiated the project in collaboration with Vestforbrændingen, a large incineration facility collectively owned by 19 municipalities in and around the greater Copenhagen area. The project coalition also included four small design

consultancies, and a previously funded centre for user-driven innovation based at the University of Southern Denmark.

The group at the Danish Design School had worked for several years within the participatory design tradition. In particular, Thomas Binder and Eva Brandt developed The Design:Lab – a workshop format that brings designers and non-designers together in a joint process of inventing, rehearsing and acting out possible future scenarios (Brandt, 2001; Binder & Brandt, 2008).

The DAIM project began with an opening seminar in which the group from the design school presented some of their previous work, and the participants from the incineration facility, the municipalities and the consultancies were encouraged to imagine ‘dream projects’. The invitation to imagine projects was later followed by an extended process of dialogue and negotiation to generate workable combinations of participants and project ideas. Eventually, the participants defined seven projects of varying sizes (Halse et al., 2010).

In the following, I examine one of these projects – one that the group at the design school considered particularly illustrative of how users and designers may together “rehearse the future” through a form of improvisational acting (interview, 8 February 2010). Three researchers from the design school directed the project.

The project focused on the waste-collection practices of a small shopping mall. Through a contact in the municipality, the researchers met the caretaker of the shopping mall, who introduced them to a shop owner and a couple of local citizens. The municipality employee and the people from the shopping mall were invited to a workshop where they were encouraged to imagine new procedures for waste collection – in particular, the possibility of collecting

complex waste fractions, such as batteries, in local stores. Using simple dolls and a doll theatre, the participants developed a variety of scenarios and tried to act them out. A few days later, the participants and the researchers met – on location, so to speak – at the shopping mall. On this occasion, they started by identifying some sites where they could attempt to perform their ideas. Next, they constructed some simple props out of cardboard boxes. Finally, the caretaker, one of the citizens and the shop owner acted out ‘their own roles’ while they used the props to practice the new procedure. The audience for this performance consisted of the three researchers and the municipality employee. The researchers later described the event in the following way: “We are gathered in one of the local shops. Quietly and attentively, we are looking at Allan, Ulla and Michael, who have just shown us how, in the future, used batteries could be returned to the shop. We are waiting for a signal; Michael makes a gesture, and Joachim [researcher] lowers his arm and turns off the camera. We applaud enthusiastically. We have really enjoyed the show!” (Binder & Foverskov, 2010: 205).

In addition to the immediate enthusiasm, the event at the shopping mall produced a number of things that were noteworthy. First of all, the event could be seen as the passing of a sort of test; the participants were able to act out their roles as shop owner or shop visitor without experiencing confusion or awkwardness to a degree that would make them stop or step out of their roles. Second, the event was video-recorded and could thus be taken elsewhere in an attempt to persuade others of the ‘realism’ of the proposed scenario. Third, the event assembled local participants as well as a municipality employee, who presumably might be able to bring the ideas to the municipality. According to the design school researchers, the event in the shopping mall did in fact persuade the

municipality to introduce a new battery-collection arrangement for that particular shop.

Discussion on Project 3:

The DAIM project's 'rehearsal of the future' had, as I have indicated, already been rehearsed several times at the Design:Lab workshops that were organised by the researchers at the design school. Therefore, strictly speaking, the shopping mall sub-project was not only a response to the invitation from the UDI programmes - it was equally a response to the researchers' prolonged and continuous attempts to find a constructive way to relate a tradition of participatory design to a collaboration with shifting crowds of private and public partners. The compositionist features, which I attempt to tease out in the following, are therefore also found in other projects conducted by the design school. The key episode in the shopping mall project may be considered an event of *persuasion*³: A group of users displayed 'something' that seemed to persuade both the shopping mall's caretaker and the municipality employee. The arrangement of this felicitous situation presupposes that the users have been equipped, enabled or articulated in a number of ways. As we know, workshops have been held, and the researchers have provided a variety of materials, instructions and challenges that have created some sort of interaction and negotiation between all the participants in the process of developing scenarios. With the props and the theatrical situation, the researchers developed an even more powerful way to test, articulate and even video-record future possibilities. The articulation of the users, however, was only one part of this persuasion event. The other, equally important activity - also carefully arranged by the researchers - was the creation of a specific audience for the performance. From the beginning of

the DAIM project, the researchers invited key participants to formulate dream projects; they later used these participants' contacts as a starting point to find more participants, going all the way 'down' to citizens. In a sense, the project then seems to have a very pragmatic approach to both project ideas and participants, as long as they were supported by key participants from the municipalities. In addition, the project systematically engaged participants in preparing and rehearsing the users' performance, which thus - with everything else being equal - made the performance particularly persuasive to the audience. From this, I suggest that the novelty of the user conception in the DAIM project may be found in a very well-equipped and resourceful articulation of the user combined with a flexible and systematic approach to assembling the audience. The user is not merely put on a stage, but performing onstage before a special audience.

Conclusion: New Versions of the User in Collaborative Practices - And New Interventions

In this paper, I have explored what happens when STS is invited to participate - specifically, in a national innovation policy aimed at 'user-driven innovation'. To do so, I outlined key elements of the conceptual apparatus that STS-inspired researchers bring to the table, and I analysed how STS contributions in three specific projects related to and merged with other concerns. In the discussion sections that followed the presentation of each project, I attempted to highlight what I consider to be the unique composition in each case. The IGSF project created an unusually long link between current studies of users and the development of Internet-based grocery shopping in the future. The Textile Qualities project

attempted the unusual task of assembling an extended 'public' to participate in the product-development activities of an industrial firm. The DAIM project arranged, dramatised and documented events where municipal representatives encountered unusually well-articulated users.

One possible characterisation of this spectacle may be that STS researchers creatively use bits and pieces of their STS background, methods and experiences to create activities that feed into their collaborations with others. In particular, we might note that the STS researchers mentioned herein seem to be attentive to – and struggle with – the formats in which their results should be delivered if others are to embrace them. Thus, the STS researchers in the IGSF project delivered a list of *theoretical concepts* to describe the stable aspects of practice, which they hoped the other participants would take into account. The Textile Qualities researchers delivered a catalogue of *product concepts*, which they hoped would inspire the designers and convince them that much can be learned by paying careful attention to users. The DAIM researchers delivered *demonstrations* and video footage, which they hoped would persuade municipal actors to put more effort into making the envisaged solutions a reality.

When considering these activities, it is clear that the STS researchers took a very active part. Using the typology of invitations that I introduced in the beginning of the paper, I might say that the STS researchers were not merely invited to *sites*, but also into the *discussions* and, to some degree, into the *decisions* made within the projects. However, this somewhat abstract characterisation raises the question of *what* exactly was it that the STS researchers took an active part in: Discussions about what? Decisions about what? As I hope to have made clear, the UDI programmes and these three projects were

highly complex meeting grounds where many things were at stake. Nevertheless, I would argue that something very significant is happening to the conception of the user in STS – both through the three projects I have described here, and through other similar projects and efforts.

To make my point, I refer back to the most well-established and classic STS discussions about the user, epitomised in the widely read texts written by Woolgar (1991), Akrich (1992) and Oudshoorn & Pinch (2002). The focus of these texts is on the difficult, situated and mutual configuration of technology and users. The issues are whether or how the users' practices are inscribed into technology, or how users might subsequently interfere with technology. These discussions imply a certain hope that users could be more realistically inscribed, or that users would be creative in their appropriation. The discussions also imply a certain concern that technologies might negatively interfere with users' practices, or that users might interfere with the technology. If we consider the projects within the UDI programmes, then it seems that both higher hopes and deeper fears were attached to the user.

Let us begin with the hopes. In the UDI programmes, the user is repeatedly depicted as a source of innovation. The innovation in question is not merely creatively tinkering with existing products; it is about imagining future products. Through their participation, the STS researchers clearly helped to perform this vision in a variety of specific ways. Their activities attempted to create various links between the users and the products of the future. We may perhaps evoke an image of the UDI programmes as a large and incomplete bridging exercise. The users are on one shore, and the 'promised land' of future products is on the other. At certain moments, the STS researchers help the users to reach farther over the chasm

– they equip them with props, invite them to workshops, or express their practices in concepts, idea catalogues or video footage that can be utilised to build the bridge. At other times, the STS researchers work with the designers and decision-makers, who we might imagine are positioned on the other shore. They encourage these people to ‘stretch’ towards the users; for instance, by inviting them to workshops or orienting themselves in various other ways towards the information coming from the user-side.

Although there is an undeniable ‘yes, we can’ rhetoric in the project descriptions and the policy papers of the UDI programmes, one might also note an undertone of anxiety that defines the concerns of the projects. One expression of this is found in a report about UDI by the Danish Business Council: “The (...) megatrend is a shift towards more critical consumers. Consumers value more individualised consumption, experiences, and unique products and services” (Danmarks Erhvervsråd, 2004: 5). Later, the Council concluded that “there is a need for investment in the development of new technologies that support the joint creation of value between companies and their customers” (Danmarks Erhvervsråd, 2004: 7). What is suggested here is not (merely) the fear that users will interfere with products in the appropriation phase. Rather, there is a fear that critical users will be ‘disloyal’ and abandon products produced by Danish companies. More specifically, the Council fears that Danish companies do not know their customers well enough, and that the companies cannot manage to create ‘joint value’ with their consumers. The great fear, quite simply, is the sudden and unpredictable loss of customers – a fear that is shared by Danish companies and the Danish government. By accepting the invitation to participate in the UDI programmes (and similar projects), the STS researchers somehow took part in this

concern, and their efforts contributed to managing the risks associated with elusive customers. The traditional close-up study of users – usually employed to understand the more or less beneficial co-constitution of users’ practices with new technologies – was now seamlessly extended to a proactive concern about how to prevent negative customer experiences, and how to retain potentially disloyal customers. Quite simply, the STS researchers contributed to the programmes’ widespread ambitions to make more of an effort to ‘get it right’ the first time; it is as though patience for bad technological solutions is running out.

The new versions of participatory design may play a particularly interesting role in this respect. These endeavours may be occasions for ‘joint value creation’ between companies and customers, to use the terms of the Business Council. But they might do more than that. They may also be devices that allow companies and public institutions to display their serious intention to listen and respond to their publics. In this sense, STS researchers may engage in the difficult task of creating publics and public trust (cf. Lezaun & Soneryd, 2007).

The STS researchers’ role as a mediator between publics and companies in the UDI projects is indicative of a more general challenge. The researchers are not merely being invited; rather, they are specifically *invited to be the ones who invite users*. As a consequence, STS researchers must constantly negotiate on several fronts. For example, articulating the visionary potential of users means getting users to do certain things, while making decision-makers recognise these things as being innovative. Monitoring elusive customers means gaining access to users’ rationalities, while making companies take these rationalities into account. Arranging a public means assembling participants, while ensuring that designers are responsive to this particular assembly.

If this is the type of risky and difficult ‘middle management’ game into which STS researchers find themselves invited, then we might consider expanding the concept of ‘intervention’ to do justice to this particular challenge. Therefore, to wrap up this exploration of ‘being invited,’ I propose four different terms that might be useful in the ongoing discussions about STS and intervention.

First, the term *intervention-as-performance* could be used to make the point that any description – always, and in one way or another – participates in the world (cf. Law, 2004); STS-inspired descriptions exist in the world, and are therefore always coming in between (‘inter-vening in’) parts of the world. Put another way, any type of intervention is intervention-as-performance. However, we might continue by specifying at least three idealised sub-types.

As a first subtype, the term *intervention-as-interference* could refer to the events where an STS analysis comes between (‘inter-venes in’) the current path of an ongoing techno-scientific project and the expected continuation of its path. In this mode, STS analysis functions like a pebble in the shoe – it interferes with the march forward. Intervention-as-interference is often done by researchers who ‘study up’ from a relatively marginalised position (cf. Suchman, 2003).

A second sub-type might be called *intervention-as-availability*. In this mode, STS researchers accept invitations to be present at techno-scientific sites, they make their analyses, *and* they strategically make these analyses visible and available to the participants. The participants, in turn, may respond by attempting to recruit the researcher, or to use parts of the researcher’s

activities and/or analyses for their own purposes. The paradigmatic example of intervention-as-availability is the STS researcher who acts as a consultant to a project. In this capacity, he or she is invited to participate in the discussions, but not in the decisions per se (for examples, see Bruun Jensen, 2007; Vikkelsøe, 2007)

As a third sub-type, the term *intervention-as-composition* might designate events where STS researchers ‘come between’ with the purpose of creating new effects by mediating between previously unconnected actors. The three UDI projects described in this paper all aspired to intervention-as-composition; they connected actors who were previously unconnected, but as I described, they also faced substantial difficulties in holding everything together. In more general terms, intervention-as-composition is typically related to situations where STS researchers act as legitimate mediators, middle managers or negotiators between two or more parties.

To conclude, I suggest that intervention-as-composition is a way of performing STS interventions that requires more attention in the future. It needs our attention because members of our field increasingly find themselves invited into this role. But perhaps more important, we should give it attention for the reason exemplified by the three UDI projects: The compositional challenges in these projects provided a strong new stimulus for the *re-versioning* of key STS conceptions. Therefore, intervention-as-composition is not merely a matter of applying the existing STS conceptions, but rather, of developing and pragmatically modifying these conceptions amidst a variety of other actors, other interests and other forms of knowledge.

Researchers invited into:	The site	The discussions	The decisions
Types of intervention:			
Intervention-as-interference	X		
Intervention-as-availability	X	X	
Intervention-as-composition	X	X	X

Figure 1. Three idealized sub-types of intervention-as-performance

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Notes

- 1 Interviews were conducted together with research assistant Anders Sund. The interviewees were: Mads Breddam, Tine Damsholt and Astrid Jespersen (IGSF project); Ulrik Jørgensen and Kira Gizella Olah Thume (Textile Qualities project); Thomas Binder, Joakim Halse and Maria Foverskov (DAIM project).
- 2 See also Johnson (2007).
- 3 I take inspiration here from the analyses of persuasion in actor-network theory; see Latour, 1987; 1991, Elgaard Jensen, 2008; Blok & Elgaard Jensen, 2011.

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