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EDITORIAL

The many faces of engagement

by Marie Antonsen, Kristine Ask, Henrik Karlstrøm

We live in an age of public engagement. At least, one might get that impression from reading the literature of the fields of public understanding, engagement and participation (PES). Over time, the PES field has moved from understanding engagement as a matter of diffusing scientific knowledge in the wider society to emerging as a participatory concern crucially relying on lay input to even be considered good science ([Horst and Michael 2011](#)).

The articles in this issue deal with different kinds of engagement and different kinds of publics. What underlies the current models and perspectives of PES is the assumption that there are other types of knowledge and expertise besides science that are relevant, important and sometimes crucial in the production of technology or even more knowledge, and that knowledge and expertise can be expressed, accessed and used in multiple ways. At the heart of this lies a democratic endeavor: The inclusion of the many publics and knowledges which in turn will produce social and political robustness. However, as Hetland shows in this issue the actual policy landscape takes a more inclusive approach and contains all these perspectives simultaneously. Hetland's article deals with a formalised form of public engagement with science, analysing the Norwegian state's changing attitudes towards communicating the science that is publicly funded in Norway, but also noting that certain elements of "old-school" public engagement remain a cornerstone of the public science communication policy (for example by funding science journalism and public information campaigns about science). In this way, he demonstrates that modes of engagement considered outdated by the expert literature might still serve a function, even if the field of what is considered public engagement is steadily expanding.

Solli and Ryghaug explore the tension between centrally produced expertise on climate change, with its effects on the natural environment in terms of increased risk of extreme weather events, and the local expertise which is tasked with handling the consequences. This is on the one hand a particularly hands-on form of engagement (as anyone who has shoveled away excess snow on cold winter mornings can attest to), but on the other hand it demonstrates the difficulty in aligning local reality with scientific understandings of best practice derived from aggregated analyses.

Pettersen's article on mediated collaboration questions assumptions about participation through platforms like Wikipedia by studying information gathering and -sharing in a fairly large, knowledge intensive company. The paper shows how the ideal situation of effortless crowdsourcing is difficult to achieve in the workplace due to

time and financial constraints. It also demonstrates the difficulty of establishing a culture for open collaboration in a corporate setting. As such it shows how participation is both materially constituted and limited, while also emphasizing the context as decisive for what kind of involvement is possible and desirable.¹

All of these are examples of what one might call benevolent engagement – attempts to include more actors in a deliberative or participatory process in order to increase inclusion and robustness of decisions and actions. However, recent events in the online world point to forms of engagement that are more aimed towards undermining or outright attacking the legitimacy of existing expertise. This malign (from the point of view of the experts, of course) engagement represents a quandary for the PES perspective. In public fora such as newspapers, internet forums or television debates, topics such as climate change, computer games, gender roles and even governance are debated and discussed with varying degrees of animosity. These often take place in what Bucchi ([2009](#)) has identified as the "science and technology ambivalence quadrant" of public participation (see Hetland in this issue for a graphical representation of this), where the very foundational principles of scientific inquiry can be questioned or modified by the debate participants.

The newest example of large public engagement on an international level, the hashtag movement #gamergate, exploded on social media in August 2014 and has generated almost 3 million tweets since². It has become a focal point for a range of grievances in game culture, but ethics in game journalism and the role of women in games and game culture are the most prominent and polarizing³. For those concerned with the role of women in games the movement, which has been repeatedly linked to cybermobs harassing female game critics and -makers, has itself become proof that games and gamers are sexist. For those troubled by corruption and politicization of the games industry, #gamergate is a much needed grassroots movement. Of particular interest to the STS scholar is the ways in which science and expertise come into play in the process of building arguments in the controversy. #gamergate has, among others, resulted in a sub-campaign called "Operation Digging DiGRA" in which gamers band together to read through game studies papers to demonstrate that the research on gaming is actually ideologically compromised activism that aims

1 As a side note, it also points to the sheer improbability of something like Wikipedia, which relies on the voluntary, non-compensated and laborious input from users, working as well as it does.

2 <http://topsy.com/analytics?q1=%23gamergate&via=Topsy&period=3%20months>

3 <https://medium.com/message/72-hours-of-gamergate-e005137cfsd>



to impose a censorial content control on games. Their reasoning is that DiGRA (Digital Games Researcher Association) has financial and political ties that gives game studies unscientific bias, and the goal of the diggers is to find and collate examples of how this research is being used to politicise their hobby against their will.

The success of #gamergate and #operationdiggingdigra is debatable, as is their intent. It is nonetheless a striking example of an interest group (gamers) engaging with academic work about their lives (game studies) to question the role of this research. Whereas this sounds like a PES dream come true, the engagement from many of the prominent actors in the case of #gamergate has a problematic feature – not uncommon in controversies of our time – in seemingly being driven by voices that bear little resemblance to the imaged publics in STS literature. The publics usually described either theoretically or empirically in STS literature possess some kind of expertise or knowledge that is or would be useful in local practices, policy and/or technology development and scientific knowledge production. STS scholars take it upon themselves to access, describe and abstract this expertise and to give it a place and a voice in scientific communities.

Whether one agrees with the idealistic model of Habermasian deliberative democracy or purposes other ways of modeling and enabling public debate and engagement, inclusion remains a basic premise. However, in the case of #gamergate, it is the explicit goal of many of the participants to exclude groups of people, particularly women, from the debate and from the game industry and limit women's rights as citizens. This is certainly a contestable form of engagement, by any definition of the term.

References

Bucchi, M. 2009. *Beyond Technocracy: Science, Politics and Citizens*. Dordrecht: Springer.

Horst, Maja, and Mike Michael. 2011. On the shoulders of idiots: Re-thinking science communication as 'event'. *Science as Culture* 20 (3): 283-306.

How can this controversy and specifically the publics engaging with anti-democratic rhetoric be grasped and analyzed, without regressing to a scientific or democratic deficit model? It is perhaps tempting to think that the participant advocating the exclusion of everyone but themselves should be silenced to a discursive death. However, these actors have the right to vote, which they might do, and the right to free speech, which they do use, if only to address the fact that they feel they are censored. Last but not least, in the case of #gamergate, they remain a large and wealthy consumer group. This of course underlines the old insight from power politics: Whatever the discourse, money talks.

In light of this, how should we address the antidemocratic voices of #gamergate? Is this merely an outcry from people with conservative, one might say reactionary, values, masked in scientific rhetoric, or do they in fact, as they themselves claim, have different knowledge or expertise which is not taken into account in science or policy? Understanding the potentially destructive counter-knowledge of such movements remains a challenge for STS, but with its longstanding work on the rise and development of scientific controversies (see for example [Nelkin 1995](#), [Oreskes and Conway 2010](#)) this is a challenge it is well equipped to address.

These perspectives are bound to receive even more attention in the coming years. At NJSTS we welcome articles and opinion pieces that address the challenges outlined above, in order to do our part in the public discussion (and hence, engagement?) about these crucial issues that put heady concepts such as Truth, Democracy, Neutrality and Free Speech into play.

Nelkin, Dorothy. 1995. Science controversies: the dynamics of public disputes in the United States. *Handbook of science and technology studies*: 444-56.

Oreskes, Naomi, and Erik M. Conway. 2010. *Merchants of doubt: how a handful of scientists obscured the truth on issues from tobacco smoke to global warming*. Bloomsbury Publishing USA.



MODELS IN SCIENCE COMMUNICATION POLICY

Formatting Public Engagement and Expertise

by Per Hetland

Three models of expert-public interaction in science and technology communication are central: the dissemination model (often called the deficit model), the dialogue model, and the participation model. These three models constitute a multi-model framework for studying science and technology communication and are often described along an evolutionary continuum, from dissemination to dialogue, and finally to participation. Underlying this description is an evaluation claiming that the two latter are “better” than the first. However, these three models can coexist as policy instruments, and do not exclude each other. Since 1975, concerns with public engagement over time have led to a mode that is more dialogical across the three models within science and technology communication policy in Norway. Through an active policy, sponsored hybrid forums that encourage participation have gradually been developed. In addition, social media increasingly allows for spontaneous public involvement in an increasing number of hybrid forums. Dialogue and participation thus have become crucial parts of science and technology communication and format public engagement and expertise.

Keywords: Science communication, policy, public engagement, expertise

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Introduction

Although several authors have aimed to analyze science and technology communication in Norway from a broader perspective ([Andersen and Hornmoen 2011](#), [Bentley and Kyvik 2011](#), [Kyvik 2005](#), [Løvhaug 2011](#)), there is no thorough analysis of Norwegian science and technology communication policy framing those activities. Consequently, the present paper aims to study Norwegian science and technology communication policy and how it has evolved since 1975. In a Norwegian context, the emphasis on the communications of science and technology was expanded and strengthened in 2003, in the revised "Act Relating to Universities and University Colleges," where it was declared that higher education institutions have three assignments: education, scientific research, and public communication of science and technology. Consequently, public communication of science and technology is sometimes called the third assignment. The third assignment should: 1) contribute to science and technology communication; 2) contribute to innovation; and 3) ensure the participation of staff in public debate.¹ We know from studies of the third assignment in Sweden that the assignment was understood both within a dissemination model as well as in more dialogical models ([Kasperowski and Bragesjö 2011](#)).

The sectoral principle has been fundamental to Norwegian science and technology policy since 1972 ([Skole 2005:61](#)). In keeping with this principle, each of the 15 ministries in Norway has an overall responsibility for research in and for its specific sector, whereas the Ministry of Education and Research has a role in coordinating national policy. When it comes to science and technology communication policy, several other ministries have crucial roles, especially when it comes to user-oriented science and technology communication. Further, the Ministry of Local Government and Modernisation is responsible for the central government communication policy. The underlying principle for central government information and later communication policy in Norway has progressed from the publicity principle ([Informasjonsutvalget 1962](#))

to the principle of public information ([FAD 1978](#)), and from there to the communication principle ([AAD 1992](#)), culminating in the principle of participation ([FAD 2009](#)). The principle of communication implies that public authorities engage in two-way symmetric communication with the citizens with the purpose of achieving mutual understanding, whereas the participation principle implies that public authorities shall take advice from affected citizens and involve them in the shaping of policies and services. Dialogue and participation are consequently growing more important within central government communication activities, and this development is a crucial backdrop for how science and technology communication policy has evolved since 1975.

Three models of expert-public interaction in science and technology communication are suggested by Bucchi and Trench: the dissemination model (often called the deficit model), the dialogue model, and the participation model ([Bucchi 2009](#), [Trench 2008](#)). As both Bucchi and Trench emphasize, these three models can coexist as policy instruments, and they do not exclude each other. Concerns with public engagement over time have led to a more dialogical mode across the three models. This paper uses Norwegian science and technology communication policy as an example. The aim of the paper is twofold: 1) to substantiate that the dialogical turn cuts across all of the three communication models, and 2) to study how each model facilitates the transformation from engagement to the acquirement of different kinds of expertise among the participants ([Collins and Evans 2007](#)). In Norway, the concept "science communication" includes also the communications of social sciences and humanities. For simplicity, when referring to the communications of science and technology the abbreviated terms communication of science or science communication are used throughout the paper. All translations from Norwegian to English have been done by the author. In the following section, I present a typology of how public engagement and expertise are formatted.

Theoretical and conceptual issues

The quest for dialogue and participation stems from two inter-related discourses: the first concerning public understanding of science, and the second based on the discourse on the new production of knowledge. To begin with, the vocabulary of public understanding of science has changed over the last two decades ([Suerdem et al. 2013](#)). Concern with public engagement has led to a shift from the dissemination model to more dialogical models. Suerdem et al. present a lexicographic and bibliometric study of the journal *Public Understanding of Science* over the last 20 years, in which they conclude that "the theoretical topics shift from modeling public understanding to formatting public engagement" (p.13).

The discourse on the new production of knowledge is concerned with new features such as transdisciplinarity, heterogeneity, the extended peer community, and the new dynamic relationship between society and science ([Gibbons et al. 1994](#), [Levdesdorff and Etkowitz 1998](#), [Nowotny, Scott, and Gibbons 2001](#), [Funtowicz and Ravetz 1992](#)). This discourse is prominent in science and technology studies, as well as in innovation studies. Concepts such as Triple Helix, Mode 2, and Science 2.0 are all concepts central to understanding the new production of knowledge.

The dissemination model is often perceived as a simple transfer

¹ <http://www.lovddata.no/all/nl-20050401-015.html>



model where knowledge is communicated by experts to various publics in an attempt to enlighten the same publics. The much-used concept for the same model in science communication, the deficit model, can be traced back to the work of C. P. Snow (1963), which claims that there is one split between the natural sciences and the humanities, and one split between the natural sciences and their applications. In his understanding of science and socio-economic development, Snow applies a linear diffusion of innovations model that also underpins the deficit model. The deficit may be overcome or the diffusion of innovations may take place only if the public is educated or enlightened. The deficit model, as well as the linear diffusion of innovations model has therefore been the object of much criticism (Egerberg, Mowery, and Nelson 2005, Hetland 1996, Irwin and Michael 2003). The criticism of the deficit model is strongly linked to the dominant view of science popularization as downstream representations (Hilgartner 1990). The press seems to constitute the most important "intermediary communication device" in this respect (Le Marec and Babou 2008:49). Bech-Karlsen offers a suggestion as to how the enlightenment tradition may be understood in different contexts. In defense of the enlightenment tradition, Bech-Karlsen points to the basic distinction between the Nordic and continental European traditions. "The Nordic variant is based upon a dialogue and respect for the recipient's values, while the European model regards the recipient as 'an empty container' which shall be filled with knowledge" (Bech-Karlsen 1996:22). Bech-Karlsen supplements this by describing the classic European tradition as a transfer of knowledge from the expert to the layperson. In the Nordic tradition, the expert enters into a dialogue with the layperson. Bech-Karlsen maintains that there is nothing principally authoritative within the enlightenment tradition, but rather the authoritative aspects are temporary and circumstantial. A similar argument is made by Broks and Perrault when they present the CUSP model or Critical Understanding of Science in the Public (Broks 2006, Perrault 2013). Within dissemination activities, Perrault identifies three models, Public Appreciation of Science and Technology (PAST), Public Engagement with Science and Technology (PEST), and CUSP. She uses the three models to study how researchers and journalists frame their popularization activities. Her main point is that "popular science writing can and should contribute to civic engagement" (p. 8) and thereby empower readers. The CUSP model aims to resolve the "lingering deficit model characteristics by suggesting a kind of science communication that considers all the elements of science-in-society, including their interactions, to be worth scrutinizing" (p. 15).

Increasingly, dissemination is also perceived as an important activity when applying for research funding: media exposure is made into an indicator of social relevance. This is also reflected in the change from the slogan "publish or perish," to "be seen in public or perish" (Väliveronen 1993). In Norway, about half of the faculty published at least one popular science article during a three-year period, whereas six percent of the faculty published half of all popular science articles (Kvvik 2005). The changes affect not only faculty members. Public relations personnel of academic

institutions are also incorporated into the dissemination process (Bauer and Bucchi 2007, Nelkin 1995). Consequently, personnel experience a convergence between the policy for dissemination of science and institutional public relation activities.

In spite of the growing literature on dialogue and participation, there are few distinct definitions that strictly separate the two concepts (Bucchi 2009, Bucchi and Trench 2008, Callon, Lascoumes, and Barthe 2009). Therefore, I treat the three communication models as part of a continuum, which is best described along two dimensions: 1) the intensity of cooperation among different actors in knowledge production processes and 2) the extent to which public participation is elicited by a sponsor (Bucchi 2009) (see Figure 1).

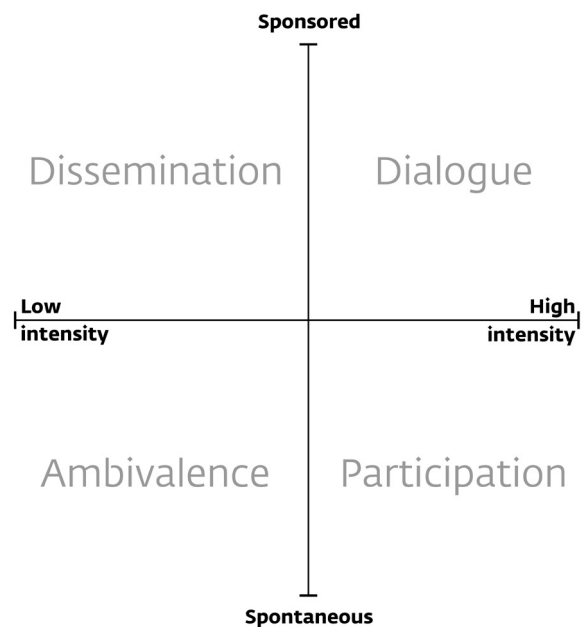


Figure 1. Participation forms for users and the public.
Source: Modeled after Bucchi 2009:66

The upper-left quadrant illustrates policy measures within the dissemination model. As already indicated by Bech-Karlsen, the space for a more active role may be larger within the Nordic tradition than it is within the classic European tradition. The upper-right quadrant represents policy measures within the dialogue model. Within the dialogue quadrant, one is able to bridge the single delegation, that is the delegative democracy or traditional representative democracy (Callon 1999, Callon, Lascoumes, and Barthe 2009). The lower-right quadrant represents policy measures within the participation model. Within the participation quadrant, one is able to bridge the double delegation, that is the delegative democracy and the secluded science by which society entrusts specialists. To encourage science and technological development and democratic participation, Callon et al. emphasize the significance of hybrid forums that permit new forms of political participation and broader insight and influence compared to the central ethical dilemmas existing within science and technological development. Hybrid forums provide



opportunity for a broad number of actors who wish to contribute to the development of science and technology, and those who are involved constitute a heterogeneous group of actors, including experts, politicians, technologists, and lay people, simultaneous to the themes that are taken up cut across traditional boundaries. However, it is not always clear what participation implies (Delgado, Kjøberg, and Wickson 2011). Delgado et al. identify five “topics of tension” when applying the concept of participation. These can be formulated as the following questions: 1) Why should the public participate? 2) Who should be involved? 3) How should it be initiated? 4) When is the right time to do it? 5) Where should it be grounded? (p. 828). I return to these tensions later in the text.

Finally, there is the “science and technology ambivalence” quadrant. Science and technology ambivalence is a rather heterogeneous category, including motivated rejection, conspiracist responses, pseudoscience, ideology, and faith (Gieryn 1999, Lewandowsky, Oberauer, and Gignac 2013). The category is an important reminder that disengagement with science in the traditional sense is not necessarily the obverse of engagement (Brint and Cantwell 2012).

Central to the three models are the various forms of expertise, and the fact that the public “remains a relatively under-theorized doxa shared by both advocates and critics of the public deficit model” (Hess 2011:628). Understanding the different publics and their roles is consequently paramount for a better understanding of what differentiate the three communication models (Braun and Schultz 2010). Collins and Evans approach science communication through an attempt to map the diversity of expertise. They start from

the view that “expertise is the real and substantive possession of groups of experts and that individuals acquire real and substantive expertise through their membership of those groups” (p. 2-3). All of us possess that which we call ubiquitous tacit knowledge, either in the form of 1) “beer-mat knowledge” (without a deeper insight into why it works); 2) popular understanding; and/or 3) primary source knowledge. Concerning specialist tacit knowledge, Collins and Evans distinguish between contributory expertise and interactional expertise (i.e., expertise required to manage a field of knowledge through interaction but does not contribute to the field). With this as the point of commencement, they attempt to develop a periodic table for expertise. Along the expertise dimension the table is constructed around, Collins and Evans refer to specialist expertises and meta-expertises. Along the knowledge dimension, one proceeds from basic knowledge (which we all have) to highly specialized knowledge (which only a few acquire). Their project contributes to a clarification of expertise as a social phenomenon and is crucial to a better understanding of the three communication models.

Finally, one problem needs to be mentioned: the relationship between models people claim to use and what they actually do. As Brossard and Lewenstein (2010) document in an assessment of how real-world outreach activities accord to the theoretical models, most outreach activities tend to use the dissemination model as a backbone, even if they claim to do something different. Consequently, the present study of models in science communication policy is primarily a study of the policy that frames science communication, not a study of how science communication is actually performed.

Method

In the next section, I provide a review of how Norwegian science communication policy has developed since 1975. The empirical basis

is a content analysis of nine white papers presenting science policy, and one white paper presenting innovation policy (see Table 1).

White Paper Science Policy	Title	Responsible Minister
St.melding nr. 35 (1975-1976)	Om forskningens organisering og finansiering [The organization and financing of research]	Bjartmar Gjerde, Labour Party
St.melding nr. 119 (1980-1981)	Om utviklingen i forskningens organisering og finansiering [Developments in the organization and financing of research]	Einar Førde, Labour Party
St.melding nr. 60 (1984-1985)	Om forskningen i Norge [Research in Norway]	Lars Roar Langslet, Conservative Party
St.melding nr. 28 (1988-1989)	Om forskning [On research]	Hallvard Bakke, Labour Party
St.melding nr. 36 (1992-1993)	Forskning for fellesskapet [Research for the common good]	Gudmund Hernes, Labour Party
St.melding nr. 39 (1998-1999)	Forskning ved et tidsskille [Research at the beginning of a new era]	Jon Lilletun, Christian Democratic Party
St.melding nr. 20 (2004-2005)	Vilje til forskning [Commitment to research]	Kristin Clemet, Conservative Party
St.melding nr. 30 (2008-2009)	Klima for forskning [Climate for research]	Tora Aasland, Socialist Left Party
Meld.St. 18 (2012-2013)	Lange linjer – kunnskap gir muligheter [Long-term perspectives – knowledge provides opportunity]	Kristin Halvorsen, Socialist Left Party
St.melding no.7 (2008-2009)	Et nyskapende og bærekraftig Norge [A creative and sustainable Norway]	Sylvia Brustad, Labour Party

Table 1 White papers presenting science policy and innovation policy



For simplicity, I will refer to the years and the relevant page later in the text, except for the Innovation White Paper that will be referred to in full.

In the textual analysis, I have primarily done an ex-ante appraisal of the different policy measures that are proposed within science and technology communication (Rip 2003). However, most of the mentioned policy measures are implemented, and a short ex-post evaluation is included for some measures. Six of the science policy white papers together with the single innovation policy white paper have been presented by Labour Party-dominated governments. Three of the white papers have been presented by Conservative and Liberal governments. However, there is a large degree of consensus within Norwegian science and technology policy and consequently few examples of major disagreements. I have therefore not attached any importance to the party-political dimension in this respect. Studies concerning the science policy debate in the Nordic countries nevertheless show that science policy most often attracts only the interest of "immediate stakeholders and people with expert knowledge about the specific area" (Kallerud et al. 2011:76).

This paper, which is based on relevant policy papers, presents a study of policy. In contrast, another interesting approach has been to study the merits public communication of science gives within

scientific institutions. From an earlier mapping we know that the qualification requirements for achieving competence within the higher education and research hierarchies have moved from a broader set of requirements, defined in 1970, to a more narrow definition of academic requirements from 1995 and onward (Finne and Hetland 2005). The change is also an important part of policy and practice; however, this point is beyond the scope of this paper.

The white papers and other relevant material are rich materials for analysis. Within each communication model, description is partly organized in a chronological manner; however, because the paper aims to explore crucial aspects of all three models for science communication used in Norwegian science communication policy a theoretical/conceptual organization has been chosen. The dissemination model as it is implied in the policy papers will be presented first. The Lasswell model – "Who (says) What (to) Whom (in) What Channel (with) What Effect" is a well-known dissemination model of communication, and, as such, it may be used to organize the description of the different policy measures within this model (Lasswell 1948). For the dialogue and participation models, the descriptions will be organized according to the central issues as described by Bucchi (2009) and Trench (2008). It is not possible to present the material in full, and the paper will only present some trends and illustrative examples.

The dissemination model

Regarding who, the center of gravity shifts from researchers and journalists in the first white papers (1975-1976:79 & 1980-1981:47) to public relations and dissemination institutions in the later white papers (e.g., 2012-2013:36). The proposals to focus on the training of researchers and journalists must be seen in the light of the virtual absence of science journalism at that time (Eide and Ottosen 1994). In addition, there were established awards based on excellent dissemination by researchers (1988-1989:69). One important problem was mentioned in two white papers, the question of whether the assessment criteria for academic positions took the question of dissemination seriously enough (1975-1976:79 & 1988-1989:69); however, a more narrow definition of academic requirements was implemented in 1995, emphasizing academic production in international peer reviewed journals. There is also a growing interest in what the journalists and researchers are going to tell the public. In the mid-1990s, Erling Dokk Holm was the research coordinator of the Norwegian Research Council (NRC), and he suggested that the concept of science dissemination should be changed from "popularization" to "something more." The latter, somewhat indeterminate concept, implies a reorientation from "the end

product" to "process" (Holm 2000). This reorientation highlights a problem concerning the dissemination of provisional research findings, something that had been already mentioned in the 1975-1976 white paper: "Over the years, there have been many examples of uncritical dissemination of provisional research findings which possibly can have had good press value" (1975-1976:78). Attempts to solve the problem have been made employing Ingelfinger's rule, first presented by Franz J. Ingelfinger in 1969 in *The New England Journal of Medicine*. In practice, Ingelfinger launched "an embargo designed to keep scientific findings out of the media until peer-reviewed and published" (Tov 2002:195). The most important policy measure was to establish the National Committees for Research Ethics in Norway in 1990 (1992-1993:113-117). The guidelines for the social sciences, humanities, law and theology as well as the guidelines for health and medicine entail rules in line with Ingelfinger's rule, whereas the corresponding research ethics rules for the natural sciences and technology do not refer to Ingelfinger's rule in the current regulations.² Early in the new century, a proposal was launched whereby an "expert portal" (2004-2005:194) would be established to stimulate investigative multisource journalism

² <http://www.etikkom.no>



concerning science (2004-2005:125), as an attempt to encourage the CUSP model. At the same time, the significance of public relations increased, and in the 2012-2013 white paper, it is emphasized that research results are also a “sales product” and that science dissemination is increasingly linked to the marketing of science and its results (2012-2013:36). The educational system is consequently understood as an important means for ensuring a knowledgeable public and a critical press.

Whom shall be considered as “the public” beyond the general public is unclear in the first white papers. The point of commencement was that if we were to succeed in engaging the public, then science journalism would have to be improved. The 1992-1993 white paper was the first to address the issue of which members of the public should be prioritized. The white paper specified that the NRC was to have the task of preparing a national strategy for science dissemination aimed at the public in general (1992-1993:154). In the national strategy ([NFR 1997](#)), the following overall objective is formulated: “Through a general dissemination of research, the aim is to encompass that part of the general public who are not traditional users of research simultaneous to including research in the public debate” (p. 7). Three main groups are defined as especially important: 1) Children and youth who will form the basis for recruitment of future researchers, 2) teachers, who are disseminators of research results to their pupils, and 3) journalists, who disseminate research and who, because of their position, can influence the science policy debate.

In addition, the same white paper states that the dissemination element should be incorporated as a systematic part of research programs and projects under the NRC (1992-1993:154). Dissemination was to be imperative. Information Director Paal Alme of the NRC writes: “In practice, if the researcher has made no attempt to disseminate state-funded research to the general public, this could result in exclusion or demands on refunding a grant” ([Alme 1995](#)). Even though such a regulation was never imposed, the statement is an expression of the increased importance attached to the dissemination activities.

The question of what channel is not made clear in the first white papers, whereas, at the same time, political measures and technological development resulted in an increased number of channels. The NRC, research institutions, and researchers comprise a three-dimensional structure that has a special responsibility for establishing innovative dissemination processes. A number of specific measures have been established or expanded, mentioned in several of the white papers, and in NFR 1997. The Norwegian Contest for Young Scientists commenced because of a private initiative as early as 1968 and grew in ambition and extent. The Nysgjerrigper Science Knowledge Project for children in primary schools was established in 1990. The Norwegian Science Week was inaugurated in 1995, during which year the Science Channel was established as a joint project incorporating the largest universities and university colleges with weekly transmissions by the

Norwegian Broadcasting Corporation. This activity came simultaneous to the launch of a number of other projects directed toward children and youth including TV series such as Newton. Forskning. no [Science.no] was established in 2002 as an online newspaper devoted to Norwegian and international science, including several possibilities for feedback and debate. By May 2014, the collaboration involved 80 research and educational institutions. The Science Centres Programme was established in 2003 as an important project, not least for stimulating the interest of youth in the STEM-fields (science, technology, engineering, and mathematics). In May 2014, Norway had nine regional science centers and five additional specialized science centers. Further, it was important to strengthen museums’ activities focused on schools. Both the museums and the science centers adopted social media to increase the possibility for inquiry-based learning. Finally, the Researcher Grand Prix was established in 2010.

In the 2004-2005 white paper, all state-financed research institutions are encouraged to develop their own dissemination strategies, and the Ministry was to develop a “dissemination indicator in the financial model for universities and university colleges” (2004-2005:128). Following two reports ([UHR 2005](#), [2006](#)), it was clear that there were larger problems than initially thought. In the first report, indicators were proposed for publication in popular (nonscientific) journals, feature articles in newspapers, popular science journals, student texts, lectures concerned with user-oriented specialist conferences, and other forms of dissemination to the general public. At the same time, there was an interest in stimulating R&D knowledge via the Internet. In the second report, “innovation and interaction with the industry” were emphasized, in addition to many of the same activities mentioned in the first report. However, the proposed dissemination indicator was not implemented, although the institutions were encouraged to develop an active dissemination policy (2008-2009:129). In many respects, it can be claimed that the dissemination indicator in the financial model was “dead in the water” when the number of channels increased and that which it was desired to measure had become difficult to measure.

What should be the results of science communication? Central to the 1975-1976 white paper was the need to disseminate information on the scope and limitation of science, such that as many people as possible would be able to evaluate the significance of science (1975-1976:77). The support of the public is thus considered an important assumption for a well-functioning science policy. Whether public support is a result of dissemination is not known, but according to the Special Eurobarometer “Science and Technology” from 2010, as much as 87 percent of the Norwegian population support scientific research even though research in itself does not result in any obvious immediate benefits. This percentage is higher than any other country in the survey ([European Commission 2010](#)). In recent years, the focus has been on children and youth, not least because they are an important recruiting ground for the STEM-fields. In 1974, 7.4 percent of the population had a university or college



education. By 2012, this had increased to 29.8 percent of those aged 16 and above. Throughout the whole period, with few exceptions it has been difficult to ensure satisfactory recruitment to the STEM-fields. Among employees aged between 25 and 34, only 1 percent have STEM-training, whereas the OECD mean is 1.6 percent ([KD 2010](#)). Consequently, several new activities are planned in order to improve recruitment in those fields, among them strengthening the Science Centres Programme and the Energy-Programme at selected schools (2012-2013:37, 63 & 99).

Over time, the dissemination model has been enriched by a movement from PAST-measures toward CUSP-measures. At the same time, the dissemination model was challenged by fundamental changes in the role of science in society. Slagstad ([2006](#)) maintains

that new knowledge regimes emerge and that knowledge is taken into use in new ways in order to promote an extensive modernization. A simple illustration of this change is to be found in the relationship between basic science, applied science, and experimental development as the Frascati Manual defines these categories. If we look at the relative strength of these three categories in Norwegian universities and colleges, it is particularly applied science that has grown constantly and evenly throughout the last half-century ([NFR Ongoing](#)). The growth has also substantiated a greater emphasis on user-oriented science communication and thereby strengthened the basis for the dialogical turn, not least because the public and users have more apparent roles within applied research.

The dialogue model

Already in the 1975-1976 white paper, the user of the research is introduced as an involved actor who can obtain more out of research if channels for two-way communication are established (1975-1976:79). Five reasons for two-way communication are given: 1) the researchers get corrective feedback and ideas; 2) the users get an opportunity to participate; 3) the research results are more easily accepted by the users and adopted if relevant; 4) both researchers and users enrich their knowledge; and finally 5) the users get a better understanding of certainty and uncertainty when interpreting the results. The coming white papers mention dialogue activities and introduces, for example, trainee-programs (1980-1981:47). However, the 1992-1993 white paper introduces the user as a much more active participant. This implies a clearer profile of science communication policy and increased emphasis on the application perspective (1992-1993:148-153) whereas, it is simultaneously emphasized that the acquirement of expertise is primarily the responsibility of the user (1992-1993:148). In the white paper, mention is also made of the Norwegian Biotechnology Advisory Board, established in 1991 (1992-1993:117). Biotechnology was presented as being of special significance concerning security and risk assessment. Important tasks include informing the public administration, and, not least, stimulation to debate in matters of science ethics. The Board has a broad basis in professionals, users, and lay people. The 1998-1999 white paper also attached importance to dialogue in various ways. It is emphasized that dissemination and application can be more difficult when those who are to apply the results have not participated in the research process (1998-1999:83). The authorities therefore recognized the need for new forums, and, in 1999, they established the Norwegian Board of Technology (1998-1999:123). The Norwegian Board of Technology was to determine the possibilities and consequences of new technology, for both society and the individual citizen. The results were to be made known to Parliament as well as to other authorities and the public. At the same time, the Board was to encourage actively public debate on technology. The Board would determine the specific areas for discussion and its working methods.

However, importance was to be attached to methods by which lay people would be engaged in the activities. The Norwegian Board of Technology today employs a number of working methods, such as lay peoples' conferences, workshops, citizen's panels, and hearings. In other words, the authorities wish to engage the public in a more comprehensive technological debate.

The dialogue model assumes what Collins and Evans call "interactional expertise" (2007). Interactional expertise was defined by Evans and Collins by means of an illustration. They write, "if 'talking the talk' corresponds to primary source knowledge (knowing what has to be said), and 'walking the walk' corresponds to contributory expertise (actually being able to perform the task), the interactional expertise corresponds to 'walking the talk' – that is, being able to use the language in novel settings in much the same way as a contributory expert might" ([Evans and Collins 2010:59](#)). In other words, an interactional expert would be able to express him- or herself concerning a given field of knowledge without necessarily being able to contribute to knowledge within that field. A good example of this is lay peoples' conferences (1998-1999:123). Holding a conference where a lay panel is confronted with a given area of knowledge assumes interactional expertise. Lay peoples' conferences are an attempt to democratize participation. What this implies in practice will vary, however ([Nielsen, Lassen, and Sandøe 2007](#)). Nielsen et al. have made a comparative study of three lay peoples' conferences on genes technology in its broadest form in Norway, Denmark, and France. What was especially interesting was that the relationship between that which took place at the conference and the major question of democracy was experienced quite differently in the three countries. In Norway and Denmark, lay people's conferences were seen as a part of the overall democracy. In France, however, lay people's conferences were considered as being directly "incompatible with democracy" (p. 27). Correspondingly, the participation of the lay people was seen quite differently. In France, the lay people are regarded as "les naïfs." In Norway, they were accredited with "everyday knowledge"



or “folk knowledge.” In Denmark, their contribution was primarily considered as a contribution to “deliberative democracy.” The different understandings naturally have different implications for how participants are prepared for participation. In France, much importance is attached to providing knowledge to the participants in what is to be the main subject of the conference; they are to be “semi-experts.” In Norway and Denmark, much greater importance is attached to the social skills in preparing the lay panelists to “perform” at the conference vis-à-vis the experts (p. 32). In other words, they are required to acquire considerable interactional expertise in order to be good participants at lay peoples’ conferences. The Norwegian informants had the broadest standpoint in this respect. They considered that “lay people could participate in a meaningful way without any prior training or education in the topic in question” (p. 33). In order to be a part of Evans and Collins’s picture, they should be able to “walk the talk,” and thereby achieve a new role for the public. In the innovation white paper, the role is

also extended to include assessments of the different technologies’ potential for innovation and economic growth (St. melding no. 7 [2008-2009]:117).

One group of activities mentioned sporadically in the white papers is the various “field trials,” such as design experiments, usability trials, and policy experiments (e.g., 1975-1976:19 & 1992-1993:138 & 1992-1993:149). Today’s society is characterized by experiments with the aim of developing new solutions encompassing many areas of society. Field trials have been discussed in the 1975-1976 white paper, and new learning methods and health issues are mentioned specifically (1975-1976:19). In some areas, trial projects are so widely used that laws and regulations exist governing their activity. Whereas design experiments and usability trials are primarily examples of the dialogue model, policy experiments are, at best, examples of the participation model ([Hetland 2011](#)).

The participation model

In the 1975-1976 white paper, a distinction was made between three target groups for scientific results: researchers, users, and the public (1975-1976:77). What is important here is that user-oriented science communication, and science communication toward the public, is considered within the same policy area. The NRC launched a policy for user-oriented science communication in 1996. The policy underlines that user-oriented science communication requires two-way communication between the researcher and the user, and that the recipient must have the necessary skills and knowledge to make use of the research results. The aim is to empower the users to act. Further, they emphasize that user-oriented science communication should substantiate monitoring and evaluation ([NFR 1996](#)).

Simultaneous to operating with a division of science communication, within the nine white papers, there are grounds to believe that the interplay between the two traditions has important implications for how the participation model develops over time. User-oriented science communication is built on a long tradition in the Nordic countries ([Tvdén 1993](#)), and over time, the dialogue with users develops into a full-fledged participation model. This model has its roots in the modernization of agriculture, simultaneous to new communication technology opening up for new interactive possibilities. In a number of white papers, agriculture and “the agricultural extension model” ([Rogers 2003:165-166](#)) has been given as an example of the participation model (e.g., 1992-1993:151-152). From the agricultural extension service, field experiments and corresponding arrangements are models of how innovation can originate and spread. Field experiments represent science communication originating in practical agricultural and plant culture trials on members’ “own farms.” The first trial association in Norway was established in 1937. Agriculture, therefore, has a long history in user-oriented research participation. Within the NRC and Innovation

Norway, a number of measures have been developed that stimulate the commercial aspects, the research activity, and the association between them. The mentioned comprehensive policy area was finally the subject of a separate white paper for innovation policy. The policy measures gradually became so many in number that the white papers discuss modern innovation theory as Triple Helix and Mode 2 ([Gibbons et al. 1994](#), [Leydesdorff and Etzkowitz 1998](#), [Nowotny, Scott, and Gibbons 2001](#)). Although it should be emphasized that these theories are controversial, it is difficult not to interpret the active policy in the field of science and innovation as being precisely a stimulation of Triple Helix and Mode 2. These theories and concepts become models for much of the political rhetoric. Triple Helix and Mode 2 are stimulated at an early stage through proposals for mobility incentives between the different research communities, producers, and users. It is emphasized on several occasions that dissemination of knowledge is most effective when occurring through mobility and networks. The concept of interaction (e.g., 2004-2005, 2008-2009, 2012-2013 and St. melding no. 7 [2008-2009]) has gradually been attaining a central place in the white papers. In the first decade of the 21st century, an “industrial PhD” was proposed precisely to encourage this interaction (2004-2005:103).

As mentioned the sectoral principle gives the different ministries crucial roles, especially when it comes to user-oriented science communication. Interesting examples of interaction are given by two ministries, the Ministry of Climate and Environment and the Ministry of Health and Care Services. The Ministry of Climate and Environment launched a new service called *Artsobservasjoner* [Species Observations] through The Norwegian Biodiversity Information Centre in 2008 ([MD 2009](#)). It is a digital reporting system open to everybody. From May 2008 to May 2014, 10.5 million observations have been recorded, mostly by lay people. These



observations are crucial in many respects, and one application is the Species Map Service used by planners and the like. Citizen science is consequently one emerging method of participation (Dickinson and Bonney 2012). While Species Observation is open to everybody, the health field is frequently more structured, and its meeting places are typically closed. Samspill 2.0 [Interaction 2.0] aims to improve patients', users', and other stakeholder's information about health and health services. Further, patients and users shall have easy access to information about their own health situation and the possibility to participate in their own treatment (HOD 2010). Within citizen

science, one important issue is how to identify trustworthy and credible information (Eysenbach 2008, Hetland 2011). Consequently, apomediation is launched as the "third way" by which users can recognize trustworthy information, and thereby it is an important element in promoting the participation model. Both within the private and public sector, the white papers emphasize participation by employees and users (e.g. St. melding no. 7 [2008-2009]:19-29 & St. melding no. 7 [2008-2009]:126). The participation model aims to involve the different publics in doing science and therefore gives broad possibilities to play out engagement and expertise.

Conclusion

Policies concerning science communication have gradually changed over time. The most important change concerns the increased importance of dialogue and participation within all three main models. Through an active policy aiming at dialogue, sponsored hybrid forums that encourage participation have gradually been developed. In addition, social media has facilitated an increase in spontaneous public involvement in a correspondingly increasing number of hybrid forums. Dialogue and participation thus become crucial parts of science and technology development. The traditional division between science and science communication was thus challenged by the various forms of dialogue, also within the dissemination model. In other words, we have a

broader inventory of types of communication and involvement. Each model therefore constitutes a development zone where policy-makers experiment with the possibility for the public to act out their own expertise in order to enhance engagement. On the basis of the two dimensions, the degree of cooperation and the degree of sponsorship, Bucchi draws a map of public participation in techno-science (Bucchi 2009:66). I will exemplify this map while drawing on some of the policy measures mentioned in the white papers since 1975 (Figure 2).

The upper-left quadrant illustrates policy measures within the dissemination model. The dissemination model experienced notable development during the 1990s and the first decade of the new century. The competition element was employed both in respect of the lay people and of researchers, thereby increasing the possibilities for engagement. The popularized news-flow is increasing rapidly, not least because of the establishment of the online newspaper forskning.no, including both many bloggers and the possibility for discussing the news presented. Further, Norway is steadily acquiring more competent science journalists. Both the more traditional and newer media are attaining feedback channels. There is much to suggest that multisource journalism is increasing both generally and as issues become more domesticated (Hetland 2012). Both processes give the public greater opportunity for engagement. Science centers and museums are adopting social media, increasing the possibilities for inquiry-based learning. The political attention on science communication has resulted in the motto "to be seen in public or perish" being taken seriously by researchers and institutions. The dissemination model consequently remains an important communication model, a finding that is also well documented by Brossard and Lewenstein (2010). Activities within the dissemination model invite the public to participate in a process where knowledge building is of a more general character. The expertise acquired by users is primarily that which Collins and Evans call "popular understanding" and "primary source knowledge" (Collins and Evans 2007:19-23). Over time, there has been an interesting movement from PAST-measures to CUSP-measures within dissemination activities. The movement is apparent in some of the policy measures suggested and implemented.

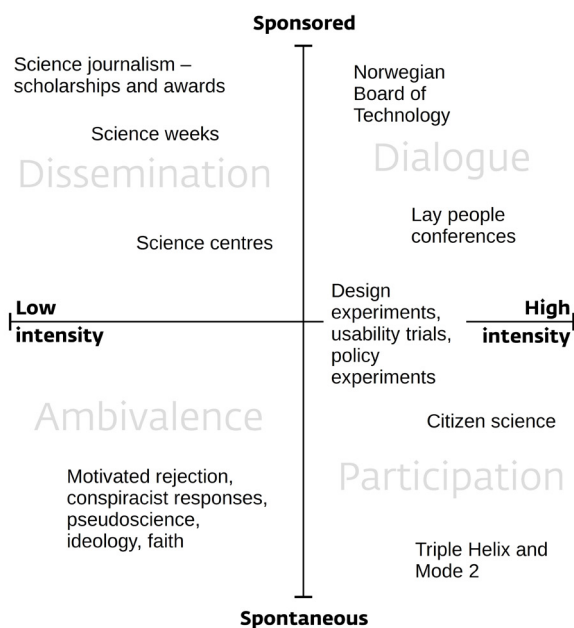


Figure 2. Participation forms for users and the public. Source: Modeled after Bucchi 2009:66



The upper-right quadrant represents policy measures within the dialogue model. The dialogue model, which aims to bridge the single delegation and extend the peer community, was developed as a policy model in the 1990s. Experimentation had already become a central work form in modern society, and increasing numbers of persons are becoming acquainted with science and technology through reform activities and the more formative experiments to manage social change. Within the dialogue model, we therefore find a number of activities because of clear political initiative involving the public and users. What characterizes these activities is that they represent an extension of democracy in forms such as the Norwegian Board of Technology and lay peoples' conferences. It is maintained that participation is important in order to ensure the development of knowledge, good risk assessment, and diffusion of innovations. However, it can also be claimed that the construction of different publics is an inherent weakness within the dialogue model (Braun and Schultz 2010), and that the model therefore gives opportunities for playing out participation and expertise within rather predefined frames. The fact that, according to Braun and Schultz, such groups are not authentic publics, but pure publics shaped by practices and settings, limits the speaking positions available. The expertise with which users contribute is primarily what Collins and Evans call "interactional expertise" (Collins and Evans 2007:28-40) but with elements of "contributory expertise" (2007:24-27).

The lower-right quadrant represents policy measures within the participation model. The participation model in general, which aims to bridge the double delegation, has its roots in the agricultural extension model as a highly successful model based on "client participation in identifying local needs, planning programs, and in performing evaluation and feedback" (Rogers 2003:394), and it has developed along two tracks. First, central to innovation policy was the inclusion of a steadily increasing number of innovation measures. Participation thus became important to shape innovations and promote diffusion. Second, social media has enabled participation in completely new ways, enabling virtual collaboration. Examples such as biodiversity mapping with the aid of species observation and patients' participation illustrate the new possibilities for exercising citizen science. The fact that public authorities undertake special responsibility for establishing boundary infrastructures, as the Species Observations, also facilitates the participation of lay people in knowledge building in new ways (Bowker and Star 1999). Participation is linked either to collaborative knowledge building, which assumes communal effort within the general sphere of knowledge, or because the user has a genuine user skill and is a central player in constructing his

or her own activity, health, and welfare. The participation model involves both the "affected public" and the "partisan public" (Braun and Schultz 2010) – that is a public that is either affected by the issue at hand or different kinds of interest groups. Consequently, the participation model opens the broadest possibilities to play out participation and expertise. The expertise with which users contribute is primarily that which Collins and Evans call "contributory expertise" (2007:24-27).

Finally, there is the "science and technology ambivalence" quadrant. Science and technology ambivalence is almost never mentioned explicitly in Norwegian science communication policy, but it is frequently implicit as an important reason for promoting science communication at all.

A review of Norwegian science communication policy clearly reveals how at a policy level concerns with public engagement over time have led to a mode that is more dialogical across the three models within science and technology communication policy. Involvement is regarded as important to ensure democratic participation, a broad participation associated with assessment of risk and ethics, exchange of knowledge, and knowledge building, as well as the encouragement of innovation and its diffusion. The growing importance of dialogue and participation is also an indicator of a weakening importance of Ingelfinger's rule. Those participating represent user interests, the need to stimulate debate, but also a genuine desire to develop and contribute with one's own expertise. Participation is organized along two dimensions: a) intensity of knowledge building, and b) whether the hybrid forums are sponsored or spontaneous. The two dimensions open up for an interesting variation of participation forms. When ideas on participation "migrate," an interpretation often occurs that adapts the participation form to fit a local context – a good example being lay people's conferences. Participation is consequently grounded in an increasingly number of hybrid forums shaped by local context.

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ASSEMBLING CLIMATE KNOWLEDGE

The role of local expertise

by Jøran Solli and Marianne Ryghaug

This paper investigates the use and production of relevant knowledge for climate adaptation activities. The analysis is based on a case study of so-called local area experts that are involved in the day-to-day practical operations of assessing the risk of avalanches in a high risk avalanche area in northern Norway. In this article we map out how local knowledge held by these local area experts plays out in relation to other forms and sources of knowledge. From this we develop two lines of argument. Firstly that assemblages of climate adaptation are produced as collaborative guesswork related to coupling and negotiation of different types of knowledge in a decision context. Secondly, we discuss what local expert knowledge might mean for the understanding of the relationship between climate science and climate policy.

Keywords: Climate adaptation, local knowledge, expertise, climate adaptation policy

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Knowledge for climate change adaptation

Human societies are facing serious threats as a result of global warming. Coping with the effects of climate change is doubly challenging, since it includes both preparing for the effects of climate change (adaptation) and acting upon its causes (mitigation). Despite the difficulty in connecting specific extreme weather related incidents to climate change in a clear cut way, the importance of adapting to global climate changes has been highlighted in recent years due to increased experiences of extreme weather events and their impact on societies, for instance related to local flood disasters. In relation to the recent super-storm Sandy, New York Mayor Bloomberg said: "Our climate is changing. And while the increase in extreme weather we have experienced in New York City and around the world may or may not be the result of it, the risk that it might be – given this week's devastation – should compel all elected leaders to take immediate action."

Norwegian climate research has shown that climatic changes such as increasing temperatures, precipitation, wind and storm activity and more extreme weather in all parts of the country are likely. Other resulting changes such as a higher probability of landslide and rock falls ([RegClim 2005](#), [Haugen & Iversen 2008](#), [Hanssen-Bauer et al 2009](#)) obviously pose serious challenges to maintaining the physical connectivity needed to support critical functions and structures in Norwegian society. In particular, the road system is seen as vulnerable towards climate change because the shift toward greater weather intensity is anticipated to influence the probability of landslide and rock falls.

Climate change has largely been framed as large-scale problems demanding large-scale solutions ([Hulme 2009](#)). This perspective has also dominated science and knowledge production related to climate change adaptation where the focus typically has been on downscaling global climate models to more fine-grained models. The way that scientific climate change knowledge to a large degree is filtered through climate models may be seen as a simplification that has aided the process of establishing climate adaptation as an issue. This has led both decision makers and scholars in the rapidly growing literature on climate adaptation to discuss the relevance of climate predictions, but also their limitations ([Dessai et al 2009](#), [Adger et. al. 2009](#)). As claimed by these authors, solving the challenge of presenting relevant knowledge is not only about providing more scientific knowledge ([McNie 2007](#), [Tribbia and Moser 2008](#)) or more reliable predictions about future climate conditions ([Adger et. al. 2009](#), [Dessai et al 2009](#)). On the contrary, we know from

previous studies on related topics that there is no simple connection between access to more scientific knowledge and better policy decisions ([Jasanoff and Martello 2004](#), [Miller and Edwards 2001](#), [Sarewitz and Pielke 2007](#), [Vogel et al 2007](#)).

There may be many reasons for more scientific knowledge not leading to better policies: The fact that the science provided is not relevant to the user needs, that the knowledge is not appropriate for the decision context and that the information is not sufficiently reliable or is poorly communicated ([Sarewitz and Pielke 2007](#)). Climate science, relying heavily on global climate models, has proven quite difficult to translate for many practical purposes (see for instance [Adger et. al. 2009](#); [McNie 2007](#); [Næss, Solli & Sørensen 2011](#), [Næss & Solli 2013](#); [Rygghaug & Sørensen 2008](#); [Rygghaug & Skjølsvold 2010](#); [Rygghaug and Solli 2012](#); [Tøsse 2012](#)). Consequently, it is central to ask what type of knowledge other than scientific information (based on downscaling of global climate models) might contribute to decision-making in a way that makes climate adaptation robust.

Adaptation to climate change is a relatively new research domain, where definitions, objectives and methods for adaptation are to a little degree settled in the research literature ([Leith 2011](#)). However, one principle that is widely agreed upon is the understanding that adaptation will always be context-dependent ([Nelson et al. 2007](#)). In this paper we argue that climate change has to be understood locally and that it is important to explore how climate change knowledge can be generated and made use of in local settings. When observers claim that the threat of climate change produces a new set of problems for policy making, they usually also point to the need to develop new kinds of expertise and knowledge related to dealing with consequences of climate change ([Giddens 2009](#)). This may for instance involve local practices of managing risks in relation to weather related events, such as avalanches. Thus, in this paper we shift away from the large-scale oriented perspective that has been dominating knowledge production in relation to climate change science by rather focusing on local adaptation practices and the relationship between different types of knowledge activated in the practice of dealing with the effects of climate changes. To be more specific, we are studying a group of professionals that in their day-to-day business as snow clearers (they actually called themselves snowmen) are responsible for assessing and managing risks related to avalanches. How is their knowledge activated in relation to other types of local adaptation practices?

Assemblages of climate knowledge

In this article we ask how professionals or practitioners involved in climate change adaptation activities handle rather unclear situations when dealing with how to cope with the risks of avalanches. Looking at how situations of impending avalanches are handled

involves study of practical knowledge. However, quite often professionals characterize practical knowledge as 'tacit' and therefore difficult to make explicit and into something that can be shared, abstracted and moved ([Schön 1983](#)). Also, practical knowledge is

often constructed from problematic situations that are confusing, disturbing and uncertain (Schön 1983). The coming together of these traits - silent knowledge and an uncertain situation - may of course challenge the task of providing knowledge that enables societies to adapt to a changed climate. Our point of departure is developed from two questions: if practical knowledge is something that is assembled from different sources, will not such a construction process involve making tacit knowledge explicit? And inspired by Bruno Latour's account of deploying controversies (Latour 2005) as a means to understand how knowledge is produced, we may ask if the uncertainty of how to manage consequences of a changed climate may serve as an occasion where routine and practical knowledge becomes salient and relevant?

In addressing the first question we emphasize that knowledge and different meanings connected to knowledge are negotiated through participation and reification. Lave and Wenger (1991) have defined this as the process of giving shape to the experience of participating through producing objects that freezes these experiences. This includes all abstractions, tools, symbols, stories and concepts that freeze practices in a "rigid" form, which is the subject of new negotiations. This means we are interested in how local practitioners make their knowledge explicit and into something that can be abstracted, shared and moved, as well as how their

local knowledge systems overlap and possibly also conflict with other assemblages of climate adaptation knowledge.

To investigate assemblages means to describe the hybrid associations of heterogeneous actors, humans and non-human (Latour 2005; Law 2004). This understanding of assemblage refers not to a depiction of the relation between different elements in a network. Rather we want to stress the point that the process of assembling shapes actors and actors' relations as well as their practices and understandings. In line with this thinking, John Law defines assemblages as a process of bundling "in which the elements put together are not fixed in shape, do not belong to a larger pre-given list but are constructed at least in part as they are entangled together" (p. 42) hereby underlining the process of making assemblages, as well as the often ad hoc quality of assemblages. Exploring assemblages also includes considering how knowledge objects and tools (be they nature objects, rules of thumb or bureaucratic forms or schemes) contribute to stabilizing an assemblage. Leaning on this kind of understanding also implies that we will be interested in processes of destabilization when analyzing assemblages of climate adaptation knowledge. Thus, by describing climate adaptation efforts as assemblages, we believe this will give us some means to better understand the character and connectivity of practical knowledge in handling practical problems related to climate change adaptation and risks.

Investigating local and practical expertise

In this paper a particular focus will be on ways of dealing with avalanches. In some parts of Norway dealing with the dangers of avalanches and landslides constitutes a normal part of the everyday work of people contracted to clear roadways. In order to make use of local knowledge in risk assessments, the road authorities have linked knowledgeable people together in a network of local area expertise. These are snow clearers and, often, elderly people with a long life in the service of Norwegian Public Road Administration. The main part of our analysis stems from data collected in October 2008, when we conducted fieldwork and interviewed persons that were part of this local professional network in the Tromsø region of Northern Norway. In addition to observing and conducting interviews with three snow clearers working in high-risk avalanche areas, we interviewed two employees of the main contractor responsible for road maintenance in Tromsø and an emergency manager in the municipality of Tromsø.

Our purpose of interviewing representatives of these three groups of actors was to trace and map out their experiences with what constituted relevant knowledge for climate adaptation work, as well as understanding their different roles in practices relevant for climate adaptation work. The snow clearers interviewed had quite extensive experiences from a period of about 10 years working in high-risk areas, and had since 2006 become a part of the local expert network, which contractors with NPRA were obliged to maintain and use (figure 1).

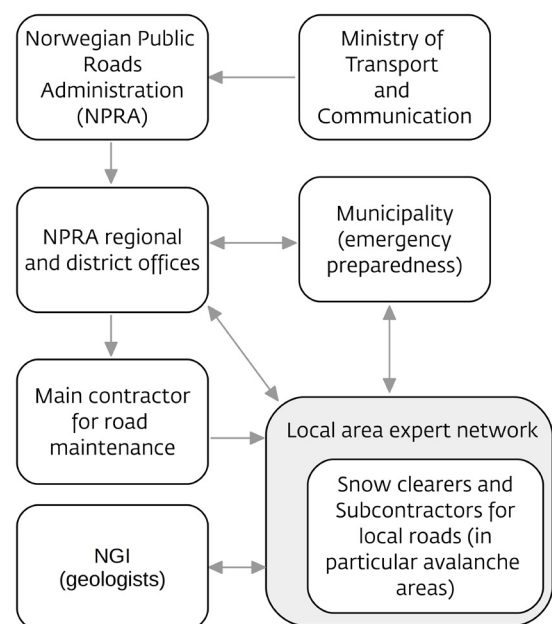


Figure 1. Central actors in the management of avalanche risk and public roads.

We interviewed three snow clearers working in two distinct high-risk avalanche locations. The first interview lasted 90 minutes and the second about 40 minutes. We used a semi-structured list of questions organized around the following main questions: If you



have experienced consequences of climate change, what have you experienced? Why did you become enlisted in the network of local area experts? What do you do to reach a decision to close off roads, what kind of knowledge do you use to do this? The interviews were transcribed by a student and we completed one of the transcriptions ourselves as dialect and sound quality made some passages in the recorded interview difficult to comprehend. The analysis of the data has been inspired by grounded theory methodology based on open coding (Strauss & Corbin 1990). Since there were quite few interviews we chose not to support the analysis by the use of a software programme.

The snow clearers also guided us into two high-risk avalanche areas. During our field trip, they pointed out evidential traces in the landscape of past avalanches and places where the most frequent events had happened. They singled out the placements, functions and malfunctions of braking mounds in the hillsides. They also referred to special objects, often large rocks, that they

used as snow benchmarks, and explained how knowledge objects informed risk assessments and their decision to close a road or not. These observations gave us valuable insights into how this group of actors developed their expertise and made use of their local expert knowledge in order to make sense of different weather phenomena. We were also made aware of how they interacted with different policy measures and other bodies of expertise.

Each of the guided tours lasted one hour. As we were guided around by the snow clearers, we engaged in a conversation that in practice became a continuation of the interview that had taken place. Our questions in the conversation emerged in a more improvised way and were mostly short questions like "what is this?" and "what happened here?" to encourage the informants to describe and to tell. We took notes from the tours that became useful in analyses. We also recorded fragments of the conversations as we moved along the tour, but these were not transcribed, partly due to poor sound quality.

Collaborative guesswork

Meeting up with two snow clearers at their home place in Breivikseidet in the district of Tromsø in northern part of Norway (almost 70 degrees North and above the Polar Circle), one of them presented himself as a third generation snow clearer. When asked about their understanding of climate changes and whether they had experienced any effects of climate change, they answered affirmatively: They had experienced changes in the weather conditions that affected their work practices. Indeed, they had observed changes in weather that they interpreted as signs that the climate was already changing. For instance, they claimed to have observed greater instability and rapid shifts in the weather conditions due to warmer winter periods. As one of them explained; "It can be four seasons in one day and it wasn't like that before". They also observed that the forest belt had moved higher up in the mountain hills. As a result the new vegetation helped bind the snow, a development they partly saw as an effect of increased average temperatures during winter. They believed that as a consequence of climate changes avalanches behaved somewhat differently than before. These days, avalanches took other routes and directions and happened in new areas. The snow clearers evidently acknowledged the effects of climate change based on observed changes in weather and nature, and used their experience to make sense of the consequences of a changed climate in relation their everyday practice.

The everyday practice of the snow clearers involved assessing risks and assembling different information and knowledge. This information and knowledge was mainly mediated through weather and temperature, from interpreting weather prognoses and their local

knowledge: experiences from the consequences of shifts in wind direction, doing measurements of snow depth, surveying self-invented benchmarks in the hillside disappearing etc. This typically unfolded as a complex process of assembling different types of knowledge¹, for example as described by one of the snow clearers, here referring to the knowledge of another local person:

Daily, during winter he pays attention to the lower parts of the mountains, looks at the conditions and contacts us when those marks disappear, which are well-known to him. He uses some rocks as marks when assessing the amounts of snow. When the rocks disappear, when it is smooth up there, then danger is impending, then it is 'overhanging danger' as he puts it (laughs). When he says this, he is often right. The most recent example [...] he called us in the evening and told us to close the road because the last of his marks had gone. The road was closed, and the avalanche went the morning after. He is certain about this. He is reliable, but these are marks and signs we have learned to look for ourselves in addition to the weather and the wind direction.

The knowledge practice involved a process of making sense of experience-based and often inherited knowledge in relation to interpretations of historic, present and predicted weather data and events. Snow clearers seemed to posit this kind of knowledge themselves, but did also contact or were contacted by other local people with a particular strong knowledge about and interest in the hour by hour development of amounts of snow and wind direction in the

¹ For a more encompassing discussion on different types of knowledge and knowledge systems see Watson-Verran and Turnbull (1995)



mountain landscape. When asked about why he was on the list of local area experts, one of the snow clearers responded: "Well, I'm a third generation snow clearer, so it is old experience, that's why. But, we do also consult others, elderly people, with knowledge about the area, when we assess the danger for avalanche."

When asked to elaborate on the interaction with other actors in the process of assessing risks of avalanches, another snow clearer said:

The cooperation was intended to go like this: the evaluations of the main contractors were made in cooperation with area experts and NGI, and the Meteorological Institute were supposed to give the weather prognoses. I don't think it works quite like that. In practise, we look at the weather forecast ourselves and make a complete evaluation before we contact the main contractor, or the main contractor calls and asks about the situation. During snowfall they may call us many times a day and want to know if there is danger of avalanches now or if there isn't.

Thus, the process of assembling knowledge was not so much a dialogue with the main contractor as intended by NPRA. In practice, it was more an ongoing dialogue between local area experts and geological expertise, both in the district office of the NPRA and in the Norwegian Geotechnical Institute. As one snow clearer reported, "During snowfall, the NGI call us, and then we will make judgements together based on the conditions of the past days." Local knowledge of weather and events seemed to be the central point in deciding how to deal with the avalanche threat. The overall process unfolds as a complex assembly of knowledge stemming from interpretations of signs in the landscape with a dynamic temporality and collaborative dimension to the knowledge production. The knowledge assemblage could be illustrated as such (Table 1):

	Weather knowledge	Event knowledge
Historic	Snow clearers and others with local, practical knowledge	Snow clearers and others with local, practical knowledge and geologists (NGI)
Present	Snow clearers and others with local, practical knowledge	
Predictions (Future)	Meteorological forecasts	Snow clearers and others with local, practical knowledge and geologists (NGI)

Table 1: Representations of relevant knowledge involved in assessing risks for avalanche

The process of assembling knowledge may be described as guesswork very much defined by being collaborative. Through this collaborative guesswork the snow clearers decided whether they should close the road or not. If we see road closing as a practise, then the collaborative guesswork is what defines its epistemic dimension, and as described above the snow clearers took the lead and managed this collaborative guesswork process. The snow clearers consulted with other local people and geologists or other representatives from NGI through use of weather reports and local, practical knowledge about the shifts in the relations between wind direction, amount of snow and local topography. Further, the snow clearers engaged in discussion about how to read or interpret these shifts. Finally, the snow clearers seemed to manage knowledge of how to time translations into actions. The translation of practical knowledge into actions can be seen as a result and example of tacit or silent knowledge "made to speak" through collaboration where actors with local, practical and indigenous-like knowledge had the leading role.² Do we see similar examples in processes of assembling knowledge for translation into local adaptation measures?

Assembling knowledge for the shaping of climate adaptation measures

Climate change has, as presented in the introduction, largely been framed as large-scale problems demanding large-scale solutions. This perspective has also dominated science and knowledge production related to climate change adaptation, where the focus typically has been on downscaling global climate models to more fine-grained models. This way of framing climate change leads to an expectation that climate policy should be shaped top-down. What characterizes efforts of shaping local climate adaptation measures?

Colour warning scheme

Downstream efforts of managing effects of climate change are represented through elements that quantify levels of danger. The road authorities had instructed both the snow clearers and the

contractors to use a coordinated "colour warning scheme" in preparedness processes (i.e. green, yellow and red indicating varying levels of danger). When describing how it was to deal with the scheme, a snow clearer referred back to the dilemmas involved in the practice of closing the road:

The contractor often tells us that one should not close the road unnecessary. They say that you cannot sit and think about your responsibility for people, that you cannot handle these thoughts after you make a wrong decision and human life are lost. But even if you don't have juridical responsibility you still feel a pressure. The guy that worked as a snow clearer before us, he couldn't do it anymore, he got scared and was relieved when he decided to quit the job. It happens occasionally with

² For more on indigenous knowledge see Purcell (1988) for definitions and directions within anthropology



heavy snowfall at night, that we avoid driving through the worst stretches.

Dealing with the expectations of not closing the road unnecessary became problematic when the experiences and knowledge of the snow clearers clearly signalled that caution should be taken. The snow clearers seemed to distance themselves from the warning scheme. For them, the crucial distinction was between closing the road or not. Compared to this choice, then, maybe the warning scheme with its three colours indicating different degrees of danger represented a misplaced abstraction for the snow clearers.

The municipality administrator responsible for emergency planning gave another version of this practise. He pointed to how the NPRA closing the road overflowed the municipality with consequences:

When it came to all the roads that the NPRA are responsible for, then the NPRA is a very autonomous authority, in the sense that they close and open when they feel for it. We have gradually had a better cooperation [...] Their decisions have consequences for emergency preparedness and have sudden consequences for civil life for which the municipality is responsible: it can be things like the kids don't get to school, or that they don't get home from school, work, travel, post, delivery of necessary medicine, home nursing, so we have some improvisations and extraordinary measures to ward off the worst consequences of it.

The snow clearer and the person responsible for the municipality

administration both emphasized how they were responsible for bringing order to the consequences for civic life and compensating for those acting less responsibly. The snow clearer questioned civil society's expectations that failed to take into account the unruly and uncertain character of weather and avalanche behaviour, and the municipality official hinted at NPRA acting irresponsibly and a bit unruly, since "they open and close when they felt for it." In their words the NPRA were not only the sole decision maker, but also closing the road appeared somewhat arbitrary. The person representing the municipality administration shared with the local area expert the task of dealing with both the consequences of the avalanche and the practice of dealing with it. The introduction of the colour-warning scheme did not seem to have much of an impact on the practice of assessing the risks for avalanche and closing the roads. Are there other examples of downstream measures focused on quantifying levels of danger that perhaps are more anchored in local knowledge?

The 30 cm rule

Another proactive measure, which is also a NPRA-introduced 'quantification scheme', is what the snow clearers described as the "30 cm rule". The 30 cm represented a threshold value of what was considered as dangerous amounts of snow that could lead to dangerous avalanche events. The background for the rule was an avalanche accident in 1997 where two people died. This avalanche happened after an extreme snowfall that added large amounts of snow to a high-risk area that already had heavy snow accumulation (see illustration 1).



Illustration 1: Snow clearer pointing to the house hit by avalanche.

Photo: Marianne Ryghaug



After this accident, avalanche experts at NGI did mapping work in cooperation with the local area experts, like the snow clearers. Although the rule was introduced by NPRA, it is only partially down-stream in the sense that the rule was constructed regionally by NPRA on the basis of the knowledge from local mapping work.

However, if NPRA in practice applied the rule without consulting with local knowledge, it could delegitimize it. The rule recommended that if there is a snowfall of more than 30 cm, then the road owner had to close the road. The snow clearers saw this as a quite sensible quantification, although they emphasized that in practice, one could not however rely on a scheme that should be obeyed regardless of the circumstances:

When the 30 cm [rule] came it was to be followed in any case. And when the first snowfall came 4-5 years ago it snowed 40 cm. Then the message came: The road is to be closed! (laughs) And this was the first snow in the mountain. This has been ridiculed. We were not involved in the assessment on this then, were just told to close the road. It seemed a bit silly.

According to the snow clearers we interviewed the whole weather situation, including the weather conditions days prior to a snowfall, also had to be taken into consideration when making these kinds of judgements. In situations like the one described above where the snowfall was the first snowfall of the season hitting bare ground, represented a typical instance where the rule should

not apply. Although they pointed to this example of rule-following behaviour as not very knowledgeable, the snow clearers had appropriated this rule as a sensible tool for making judgements that supported their local area expertise. Local measurements of snow amounts and mapping were local knowledge that was translated into a rule of action. Together with the colour warning scheme this example indicated that it was quantifications of danger levels that supported the translation of knowledge into action. But, dealing with avalanches and the maintaining of roads are relatively practical tasks. Where was the materiality of local adaptation measures?

The mocking mound

The construction of a braking mound to shed the roads from avalanches was the physical and highly visible example of a locally placed assemblage of climate adaptation knowledge. The area in which the mound was placed was a naturally high-risk avalanche area. However, what made this area particularly vulnerable was that the road to the ferry landing went through the area. An avalanche at the ferry landing where vehicles frequently lines up for the ferry, could have relatively severe consequences even though the area itself was relatively sparsely populated. In order to diminish the dangers of avalanche hitting this exact part of the road, the NPRA had built what the snow clearers described as a “fancy” avalanche braking mound of rocks, in other words, a large rock wall constructed to protect the nearby road leading to the ferry landing from avalanches (Illustration 2).



Illustration 2: The mocking mound.

Photo: Marianne Ryghaug



The snow clearers ridiculed the shape and function of the rock wall construction, pointing out that the wall in fact had no depot behind it, something they saw as necessarily to catch the enormous amounts of snow coming down. They had envisioned the worst case outcome resulting from this malconstruction being that the snow would tear the braking mound apart and bring the big rocks down on the line of cars waiting for the ferry. According to the snow clearers the braking mound was “only a symbol of safety.” The construction of this symbol of safety placed right in the middle of their area of local expertise was perceived as a provocation evidenced by the nickname they had given to it

– the “mocking mound.” So the braking mound, not only served as a symbol of safety, but also was seen as a materialization of mockery. This materialization of mockery acted both ways – as a thing that the snow clearers as local area experts ridiculed, but at the same time it functioned also as a physical reminder that their local indigenous knowledge was not appreciated and taken into consideration to the extent they expected. As it turned out, their local knowledge had not been solicited when the mound was planned and built. Consequently, their confidence that climate adaptation measures would be designed in interaction with local expertise was relatively low.

Knowledge and learning in preparing society for emergency

The observations above of what actors are ascribed to what actions are important to our tracing of the process of making climate adaptation knowledge assemblages in practice. Further, tracing which figures qualify as actors is also important for this task. Even if the fatal avalanche incident described above led to the construction of the 30 cm rule, the snow clearers experienced that the accident did not really lead to any practical changes, for instance in emergency planning or to any new measures indicating there was a willingness to learn from earlier experiences. The snow clearers expressed frustration that there was no following up and little was done to register avalanches they previously had reported. This became evident when reporting on an avalanche in the winter of 2007. In this case they were told that this was not an avalanche area. However, according to the snow clearer;

‘Yes, it is,’ I said, ‘many avalanches have happened there.’ But, then they asked us; ‘Why haven’t you told us before, why hasn’t it been registered?’ It has in fact been reported on many times before, but I have a suspicion that they take it more seriously when you cut off an entire community.

Thus, according to the snow clearers, what they reported was not systematically kept record of by the authorities. Their reports of danger passed by relatively unnoticed except from the situations when the whole community was isolated. The accounts from the snow clearers indicated that their experiences of using relevant knowledge to protect people and traffic on community roads from avalanches were not linked to a sound policy to protect the whole community in a state of emergency. We see how the snow clearers

perceived the problem, which is inextricably tied to their work practice and the already existing knowledge about the weather and climate. Their accounts also showed the external constraints of their room for action in terms of materiality, regulation, and the economic resources that could enable it. Their experiences and observations were rather retooled to fit strategies shaped by decision makers located elsewhere, like the colour scheme based on quantifications of threshold values.

A focus on increased preparedness represents a central part of the road authorities’ way to respond to climate adaptation. However, according to the snow clearers interviewed here, there had been no answers from the manager in the municipality regarding how one could be able to reach the local community in case of an emergency, or how to bring people out of an isolated community and into safety if a large avalanche were to hit the road. One of the snow clearers said that he had asked for an emergency plan and had even made an offer to the municipality that they themselves could cut down the trees in the area so that they could have an emergency route that could work for caterpillars if they were isolated by avalanches, if they got paid to do it. As they claimed, “We have offered simple solutions, but have not succeeded in getting response from the municipality. We don’t feel that our work is valued.” The last remark effectively sums up their view of their role in the work of dealing with the consequences of climate change. Further, the lack of an emergency plan led them to question the will of the wider society, in particular the municipality administration, to actively implement a policy for dealing with risks related to avalanches.

Shaping adaptation policy sideways?

Climate science has been criticised for only to a small extent being able to offer useful knowledge for decision makers ([McNie 2007](#); [Næss, Solli & Sørensen 2011](#), [Næss & Solli 2013](#); [Rygghaug and Solli 2012](#); [Tribbia and Moser 2008](#); [Tøsse 2013](#)). Good contact between existing local expertise and professional knowledge is therefore an important condition for making good adaptation and preparedness

measures. Here, we have seen that professional users of climate knowledge are actively assembling a network of locally available items in the process of creating meaning around climate change and climate adaptation strategies. We have placed particular emphasis on highlighting the connections between natural objects and snow included in practical, experiential knowledge. Many of



the actors also obviously used mediated scientific knowledge such as weather forecasts in the assemblages. Thus, key findings are that the weather forecasts and local area expertise help to develop the understanding of the problem and the problem setting that form the basis for developing climate change adaptation strategies for more resilient societies. Furthermore, we have seen that knowledge about and propositions of new ways of organizing emergency activities represent local practical knowledge arising from direct experience of dealing with the effects of climate change. Such knowledge can be formulated in general, as for example in the form of desire for more collaboration across sectors. When there is not an either/or relationship between scientific climate knowledge and other relevant knowledge in order to do climate change adaptation, then this will both have implications for how we understand the suitability of adaptation measures, and how we understand climate knowledge.

Our general argument in this article is that tracing assemblages of knowledge envisioned a rather broad range of ways of knowing. However, describing this knowledge is not straightforward. For example, the term “indigenous-like” knowledge has long been associated with the terms ‘local knowledge’ or ‘ethnoscience,’ indicating knowledge systems that are specific to cultures or groups in particular historical or social contexts (Richards et al. 1989). Adding ‘indigenous’ to the terms ‘knowledge’ and ‘science,’ then, signalled the embeddedness of indigenous truths, in contrast to the context-free ‘truth’ of science. As noted by Philip (2001), the distinct meanings and uses of the terms ‘indigenous knowledge’ and ‘science’ both depended on “a dichotomy separating universal, value-free, static truth from situated, value-laden, changing cultural beliefs (Philip 2001: 7292). This dichotomy has been radically challenged by anthropology and STS, which suggests that all knowledge, including scientific knowledge, is specific to its particular cultural context. All knowledge, then, might be considered “local”. The distinction between indigenous and scientific knowledge continues, however, to play a role in analysis of knowledge practices. For example, Wynne (2007) has in the field of biosafety pointed to how examination of relations between indigenous and scientific knowledge practices provides perspectives on how to construct more rigorous and publicly legitimate risk assessments. Our analysis describes a process where indigenous and scientific knowledge are assembled locally. But, to what extent is the coupling of forms of knowledge involved in the shaping of climate adaptation measures?

Other studies looking at climate adaptation in Norway have demonstrated that regulations and/or coordination support from above in the domain of climate adaptation is in demand (Næss, Solli & Sørensen 2011; Rvqhaug and Solli 2012; Næss & Solli 2013). The point in this paper is not to argue that such a need is of little importance in order to create socially robust climate adaptation measures. Rather, we want to cast light on how local knowledge is produced through collaborative guesswork related to judging, communicating and acting on risks and dangers, and that this work has (and

should have) possible consequences for the shaping of local adaptation policies. In our study, we saw that the practice of collaborative guesswork involved coupling and negotiation of different types of knowledge (weather data and event data – historic, future and present) in a decision context. Actually, an institutionalization of such a mix of existing local expert knowledge and meteorological prognoses may contrast and possibly provide lessons for governing institutions in translating and moving local knowledge into quantified information as a part of monitoring systems on a greater scale in the road sector.

This single case history provides an example from one sector in Norway, a country that is not especially vulnerable to climate changes compared to societies struggling to cope with threat of sea level rise and its possible devastating consequences. However, Norway seems to share with many countries the trust that model based climate science will be the main provider of useful knowledge to be appropriated by different users in tackling the effects of climate changes. Our study points to the importance of other types of knowledge in the process of developing practices of collaborative guesswork, and hereby suggests an alternative way of understanding a process of policy shaping in relation to climate adaptation without using a standard conception of politics where a policy development process is seen as either moving top-down or bottom-up. Following assemblages of climate knowledge reveals a process that to a greater extent might be seen as moving sideways. This horizontal approach is compatible to thinking about the shaping of climate knowledge and policies in terms of what gets included or excluded and what is considered internal or external to a decision making context.

Despite the vital role of snow clearers and other people with local practical knowledge in the collaborative guesswork their knowledge was largely externalized in both the design of physical avalanche prevention and in the implementation of a local emergency plan. This externalization demonstrates one major constraint related to the room for local action (in terms of materiality, regulations, policy and economy) as these factors are crucial in defining whether knowledge is relevant or not (Sørensen et al 2000). What is thoroughly documented in our analysis is exactly the fact that it is the local experts that are performing the day-to-day climate politics of avalanche protection in this locality. Further, our analysis lends support to the suspicion that constraints of this sort are active through widespread expectations that more accurate and relevant scientific knowledge is to be moved in one direction from climate science through the traditional knowledge and policy institutions and their traditional intermediaries. Although we at this point see few examples of local collaborative knowledge activities and practices integrated into formal policy processes, we do see that there is a potential of integrating this kind of knowledge in decision-making processes. Drawing upon the lessons learned from this case study may provide insights applicable to other decision-making contexts where environmental knowledge should be appropriated. Thus, a call for better translations from



the supply side of scientific knowledge to the demand side must acknowledge that the grey areas represented by local, sometimes indigenous-like, knowledge brokers also should be included as

being part of the supply side, and that they in practice contribute to shaping policies sideways and hopefully creating more socially robust climate adaptation policies.

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FROM MASS PRODUCTION TO MASS COLLABORATION

Institutionalized Hindrances to Social Platforms in the Workplace

by Lene Pettersen

This article addresses the importance of institutionalized practices when social media are introduced as collective platforms for the workplace. It examines why the great engagement envisioned for these tools has yet to be realized in organizational settings. The dynamics in the workplace and in distributed networks (e.g., Wikipedia, Linux) are compared and found to operate with different social structures and different practices at play. However, with the introduction of social platforms, collective and engaged actions are expected from employees. The nature of our notion of work in the workplace is colored by individual organization (employee-employer contract) and measurement of time (work hours) and money (wage) derived from a capitalist paradigm, whereas drivers at play in distributed networks are not measured in terms of quantity but quality (e.g., good work, strong reputation, high social status). The article presents a comprehensive qualitative and longitudinal case study of knowledge workers employed at a knowledge-intensive organization that operates in twenty-three countries in Europe, North Africa, and the Middle East. Many of the employees in the study explained that the company's social media platform becomes just another object to track in an already hectic workday in which individual drivers triumph over collective priorities.

Keywords: Productivity, mass collaboration, distributed networks, social enterprise media, knowledge work

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Introduction

This article addresses the importance of institutionalized practices when new objects or ideas are introduced—in particular, social media's introduction as a collective platform for the workplace—and why the great engagement envisioned for these tools has yet to be realized in organizational settings. Some explanations can be found in the nature of modern work, which rests on a capitalist paradigm with profit, productivity, and individual work contracts as fundamental principles, in contrast to motivational drivers such as social status and intrinsic motivation that are at play in collaborative paradigms.

Although the term “innovation” typically evokes thoughts of new objects or products, it also refers to ideas or practices that individuals perceive as new (Rogers 2010, 11). Innovation thus concerns social changes as well: the introduction of new practices to be used by individuals within social structures. Practices—defined as shared routines of behavior, including traditions, norms, and procedures for working, thinking, acting, and using things (Whittington 2006, 619)—need to operate alongside objects within established social structures. Institutionalized practices do not follow automatically when new objects are intentionally introduced for the better. For example, the Yir Yoronts, an Australian aboriginal community, were in a technological Stone Age in the 1930s, with no knowledge of metals (Sharp 1952). The Yir Yoront community was characterized by clearly defined roles and ranks; no two people were considered equal, and they could identify subordinate and superordinate positions in any context. Trading practices were similarly based on rank, and men would travel long distances to get the stones they needed for their axes. Such trading tours were coordinated

with religious festivals at which stone axes were traded with other tribes. Each axe was traced back to ancestors from the Stone Axe Cloud Iguana Clan who had originally made it and had traded it with ancestors of other clans. In short, the stone axe played a key role in the Yir Yoront community because the axe reinforced the Yir Yoront system of beliefs, kinship, rank, social status, and age and gender differences. When missionaries entered the Yir Yoront community, they brought steel axes for those who promised to be good Christians. Suddenly, every Yir Yoront could access an object that played a key role in the community's actions and social structure. One year later, that community had disappeared. Unlike the stone axe, the steel axe did not interplay with the key elements for the Yir Yoronts. Furthermore, there is no guarantee that introducing more of something will provide more of the same effect. This was the case with Norwegian television. When Norway had only one television channel, it served as a unifying medium for Norwegians. However, when multiple channels were introduced in the 1980s, the opposite effect happened: multiple television channels divided the Norwegians (Eriksen 2001b). Similarly, Microsoft's MSN did not succeed in Japan as it had elsewhere because the chat function did not align with Japanese conversation norms (Kirah 2009). Because the act of not replying when addressed by others is perceived as impolite in Japan, MSN chat conversations could continue indefinitely. MSN's transparent logged-in feature was therefore changed to enable users to reply to others when the timing was better. As a result of this later innovation, MSN became more successful in Japan. These examples illustrate the important role that practices (rules, values, and norms) in social structures play when new objects or ideas are introduced.

Organizations seek collaborative logics in the workplace

Organizations today seek to copy the potential that lies in collaborative models in which individuals willingly contribute content without traditional organizational structures (Shirky 2009). The collaborative tendencies observed in volunteer organizations at which individuals work for free are sought copied in the workplace. Examples of such organizations are Linux, where programmers create open source code in their spare time; Wikipedia, where Wikipedians are volunteer contributors; EteRNA, where online gamers help reveal new principles for designing ribonucleic acid (RNA)-based switches and nanomachines to seek and eventually control living cells and disease-causing viruses; and Mindboards, where Lego enthusiasts post source and binaries for many different LEGO MINDSTORMS tools. Cook (2008) pointed to this mass collaboration tendency, previously described in *Wikinomics* by Tapscott and Williams (2008), which illustrates how technologies in the twenty-first century enable masses of people to crowdsource and co-create. Cook argued that new social platforms would change the future of work. Enterprise

social media (Leonardi, Huysman, and Steinfield 2013), enterprise 2.0 (McAfee 2009), and social intranets all refer to technologies with Web 2.0 features such as interactivity, social networking, group collaboration, co-creation, blogs, tags, personal profiles, and file sharing. The common shorthand description of social enterprise platforms is often “Facebook inside your company”, because the software mimics some of the core functions found on social network sites (e.g., Facebook) while adding specific features to use within a business (e.g., share an idea, vote for an idea) (Carr 2012). Social media platforms have been introduced in the workplace not only to foster the collaborative tendency observed in distributed networks and social sites, but also to create productive and advantageous behavior among employees (Dignan 2008). Social platforms are predicted to increase employee productivity by twenty to twenty-five percent by moving time spent managing email and searching internally for information and competence to a collective platform, thus freeing up time for other tasks (Chui et al. 2012, 11).



However, most organizations fail to make employees use these social platforms. The massive engagement that was predicted to revolutionize the modern workplace has yet to occur (Chen 2011). One typical explanation is that “old habits die hard”; employees prefer established technologies they already use to new ones (Chen 2011). Even so, organizations have been advised to strive to increase employee engagement so they can take advantage of social platforms (Mann 2013). Different advice on how to spark such engagement has been set forth: for example, managers must be role models, supervisors should lessen their control, and bottom-up processes are necessary to empower employees (McAfee 2009, Cook 2008).

This article takes a different stance by studying how the nature of work is part of the institutionalized practices of organizations’ social structures. I argue that the work contract and the calculation of work in time and money are important hindrances to creating a collaborative workplace. New collaborative models rely on logic different from that of capitalism, which is built on competitive principles aimed at profit. The two models or contexts are different. Furthermore, it is typically taken for granted that the user engagement observed in distributed networks is beneficial *per se* for the organization and that the goal should be to create mass collaboration among employees within the organization. This is problematic in at least two ways. First, a key tendency on the Internet and in the external social media landscape is the 90-9-1 rule, which states that most people use the Internet only to read, a few participate regularly, and only a small segment is composed of active participants (Nielsen 2006). The potential pool of contributors is thus a lot larger than in the organization. Second, knowledge professionals employed in an organization have specialized domains and skills, and others with whom they share work characteristics do not necessarily work in the same organization. Moreover, the networked economy, where the benefit of cooperation and collaboration is acknowledged (Krokan 2013, Beniger 1986, Tapscott and Williams 2008), has motivational drivers other than economic exchange alone. The organizational world is much smaller than the Internet, and the rules are different (Levy 2009). Work structures and communication processes also differ between employees in corporate settings and peers in web communities (Schneckenberg 2009).

Furthermore, as the Yir Yoront, MSN, and Norwegian television examples illustrated, the collaborative models in distributed networks rely on logics different from those in the workplace. With this backdrop in mind, I argue that we need to return to the very notion of what work is—knowledge work, in particular—to obtain a deeper understanding of why copying and pasting a Wikipedia model into the workplace is problematic.

When we seek to explain social change, or the lack thereof, we need to start with the individual—with agency (Lauring 2013). The interplay between agency and social structure is the heart of structuration theory (Giddens 1984). According to the theory, individual actions occur within the contexts of existing social structures, governed by norms and rules distinct from those of other social structures. Social structure consists of the rules (implicit or explicit formulas for action) and the resources (what agents themselves bring into this action, such as knowledge and abilities) that both enable and restrict individuals’ actions (Giddens 1979, 69). This is labeled the duality of structure. The duality of structure confirms established practices and at the same time is open to changes because individuals are knowledgeable. The interplay between an individual’s actions and the social structure is a centrifugal process sustained and modified by human action, a process that enables adjustment and change in other parts of the system. Agency is closely related to other social systems (Giddens 1984) such as a hierarchical authority structure, a cooperative structure within a participative workgroup, or the normative structure of a professional community (Orlikowski 2000). More specifically, I address the following questions in this article: (1) What are the institutionalized practices for work—in particular, knowledge work? (2) How do these practices correspond to the motivational logic at play in distributed networks (e.g., Wikipedia, Linux)?

Work is the process of completing tasks and is most often measured by the clock (Kjaerulff 2010). It is conducted in terms of economic exchange between employee and employer (Giddens, Duneier, and Appelbaum 2012). The term “institutionalized” refers to the solidification or ritualization of social life through the repetition of actions that become practices that are taken for granted (Eriksen 2001a). Organizations are dynamic systems consisting of individuals’ actions (Davis and Scott 2007, Weick 2001). Knowledge-intensive organizations employ knowledge workers whose work largely consists of non-standard problem-solving as well as the production of knowledge, services, products, and activities that require a high level of education, special skills, and creativity (Løwendahl 2005, Kuvaas 2006). As Davenport (2005) put it, knowledge workers think for a living.

In the following section, I begin by presenting work from a historical point of view to more fully grasp several fundamental principles in our understanding of the notion of work. Then, I present the case study from which this article draws its arguments, followed by a presentation of several key findings relevant to the research questions asked in this article. I then discuss and compare the two organizational models (the workplace and the distributed network). I end the article with a discussion of the study limitations and a call for further research.



Work from a historical point of view

Before the rise of modernity, the economy was closely intertwined with the social relations of humans (Polanyi 2001). With the Industrial Revolution and the increased production of goods, independent craftsmen became wage workers. This shift allowed capitalism to fully blossom (Weber 1998). Capitalism is an economic system in which capital assets are privately owned and goods and services are produced for profit in a market economy (Eriksen 2001a, Weber 1998). The organization or the enterprise is a player in a competitive marketplace based on the logic of supply and demand. Such external elements play a key role in how an organization's resources are managed and organized internally (Penrose 2009).

Weber (1971) used the bureaucratic model, with its characteristic hierarchy and clear division of labor, as an example of the most efficient and rational way to top-down organize human activity. In this model, systematic processes and organized hierarchies are necessary to maintain order, maximize efficiency, and eliminate favoritism. Organizational models with different degrees of decentralization emerged in parallel with mass production (Chandler 2007), often in terms of Henry Ford's assembly-line thinking and Taylor's classical experiments on employee motivation to increase efficiency and productivity. Parallel to industrialization, work was controlled and measured by the time spent performing work, rewarded in terms of economic incentives, and supervised by management, with punch clocks registering and controlling employees' work time. Work was, and still is, a formal contract between the employee (the owner of the work capacity) and the employer (the owner of the production tools). The relationship is based on an economic exchange: work is a commodity exchanged for an economic incentive, namely salary. The transaction between work and capital relies on a foundation of manpower (Sørhaug 2004).

However, Western society has undergone various changes over the past hundred years, and fundamental institutional changes have been taking place (Castells 1996, Giddens 1990). For example, the service sector now generates more wealth than the manufacturing sector of the economy (Dekas et al. 2013). In the knowledge economy, knowledge workers themselves have become the value (Sørhaug 2004).

The case study

The organization is a French listed medium-to-large multinational, knowledge-intensive organization with approximately five thousand consultants, with entities in more than twenty countries in Europe, the Middle East, and North Africa. In this study, it is anonymized as Tech Business Company (TBC). TBC operates where information communication technology and business intersect and offers services spanning consultancy and technology with a shared service portfolio. Having a shared service portfolio implies that the different entities have specialized fields and domains of expertise that would be relevant for other TBC professionals working in the

Because of the Internet, globalization, and increasingly improved information systems, the world has become smaller and in many senses more connected (Drucker 1992). In the past, work was less differentiated; therefore, it was easier to know what people did simply because there was less to know (Orr 1996, Fayard and Henderson 2002). Today, work is highly complex and invisible (Suchman 1995, Orr 1996). With the division of labor, modern workers have become increasingly specialized (Huber 2010, Schneckenberg 2009), which raises the question of how many other colleagues in the same organization it would be relevant to collaborate with or assist via a collective internal social media platform in the first place.

We are currently caught between different societal paradigms: one based on a top-down, market-based, competition-oriented logic and another based more on democratizing principles, mass collaboration, and networked logics. Individuals participate in the development of products and are responsible for much innovation (Von Hippel 2005), and they collaborate through distributed communities without economic motivation. Collaboration is a key tendency of our time, yet the concept of work is still built on traditional and individual principles. Employee work is still a formalized contract between the employee and the employer, and work is still measured by the clock and rewarded with money. Key performance indicators are established to measure individual performance, and the punch clock is still in use (Dahl 2013), despite recent studies showing that increased innovation occurs when employees are empowered to choose how to use their time (Dekas et al. 2013), and despite the fact that we have moved from working on time to online (Sørhaug 2001). Control systems are suggested by agency theory as a way to minimize opportunism and create the most efficient contract between a principal or employer and the agent or employee (Eisenhardt 1989). Similarly, transaction cost theory sees individuals and firms as rational, from which arises the concept of opportunism: individuals act to maximize self-interests (Williamson 1985). But when we look at engagement and individuals' contributions in distributed networks, the arguments of opportunism fall short. The nature of work has changed (Dekas et al. 2013), but the models for doing work (work contract, time, money) have not.

other entities. For example, employees in Denmark working with cloud computing topics, or the process of facilitating a large project for the health industry, should be relevant for employees who are working on similar projects but are located in different entities. Thus, a company internal social platform could enable employees to reach out to colleagues at other TBC entities who are working on similar topics.

The sample in this study is composed of consultants who provide the daily services that TBC capitalizes on. Consultants provide



professional or expert advice based on their specialized field of expertise and domain of competences. A typical work design for consultants is a billable-hours model; the client pays for the number of hours the consultant has spent working on client matters (Løwendahl 2005). With this work design, a flexible work context typically follows: the consultant is most often located at the client's site when doing client work. A common pay model for consultants is a mix of fixed pay and a bonus based on the degree of billable hours the consultant has produced.

Implementation strategy

TBC introduced a global social enterprise platform (Jive Business Software version 4.5.2) in 2010–2011 as a replacement for local intranets and other local initiatives (e.g., Yammer). Jive Business Software is one of the best-known players in social enterprise platforms and was ranked as a leader in the business field by Gartner (Carr 2012). TBC's overall goal for introducing a social enterprise platform was to better utilize the knowledge capital of TBC professionals to "build professional networks, develop competence by following others more skilled, finding out what others are doing and not reinventing the wheel, having things you're working on easy to find and share, easily work with colleagues in other business units" (from TBC's implementation strategy).

The local entities introduced the platform differently. Although some entities arranged courses and training, others sent only log-in and password information to TBC professionals via email. However, several employees reported that they did not have the time to participate in their entity-arranged courses. The analysis did not reveal a consistent pattern between course participation and degree of social platform use. The consultants were encouraged to use the enterprise media platform, but no formal guidelines or requirements were set by the management for platform use. All other existing computer systems (e.g., email, document management systems) were fully available to the entities after the enterprise media platform was launched.

The routines for becoming a platform member were via the IT department in the parent company in France. The IT department created the employee's user profile and sent the log-in and password information to the employee via email. This sign-up process is different from that of most social networking sites (e.g., Yammer, LinkedIn, Facebook) in which the user is guided through an online process and offered relevant suggestions by the platform (e.g., individuals and groups to follow, sign privacy consent).

The top management in the parent company actively used the social platform and wrote blog posts in which they shared strategic company updates and insights into why the platform was introduced. Community managers from the parent company were actively present on the platform, providing help and tips on how employees could get the most out of the tool. Human resources

employees or others at the local entities had, to varying degrees, a dedicated role to serve as community hosts for their local entity. These individuals formed a "community-manager network" for sharing insights and advice.

Research design

Because the overall goal is an in-depth understanding of how the nature of work corresponds with the organization's expectations of introducing a social enterprise media platform, I chose a qualitative methodological approach with the following research design:

Open-ended, in-depth interviews¹ with twenty-seven knowledge professionals from the UK, Denmark, Norway, and Morocco were conducted in 2011. Eight of the participants (from Norway and Morocco) were interviewed again in 2012 to control for time.

Ethnographic field studies (in Norway and Morocco, three weeks each) and participatory observations (in Denmark and the UK) were conducted in 2011. The field studies in Norway and Morocco were repeated in 2012 to see if there had been any changes in employees' platform use over time.

Key informant methodology was used as a tool for obtaining information over time from individuals who knew the community well (Pelto and Pelto 1978).

Social network data for the twenty-seven participants were gathered at the end of the interview. The participants listed the colleagues they reach out to and who approaches them when they needed work-related assistance. These offline network data were coded in the network tool UCInet, and then analyzed and compared with their online interactions in the organization's social enterprise platform (particularly who they followed, which groups they were members of, and who the other group members were).

To control for employees who did not use the enterprise platform due to low digital competence, a self-report form based on the technology acceptance model (TAM) criteria (Chung et al. 2010) was handed out at the beginning of the interview. Twenty-four of the twenty-seven participants scored high on digital competence.

The organization's strategy documents, implementation strategy, and social enterprise platform were thoroughly analyzed.

I entered TBC before the platform was launched in 2010–2011 (a pilot was run in Norway in 2010). Because I had a password and log-in details, I also had access to the platform when I was not in the field settings. Thus, I followed the organization closely over three years (2010–2013). I will now present some of the key findings that are relevant to the two research questions asked in this article.

¹ Marika Lüders did 9 of these 27 interviews. I interviewed employees from all the entities included in this study.



Use of the social enterprise platform

Since individuals' use of technology, and not technology itself, can make social change (Orlikowski 1992), the logical first step would be that employees take the social enterprise platform into use. In this study, the social platform was used very little. Since twenty-four of the twenty-seven participants scored high on digital competence, the low use is likely not related to a lack of digital competence. Out of the twenty-seven participants, fewer than half used the platform regularly, and only half of such use was done in a knowledge-sharing manner (i.e., active participants who contributed content, such as by writing blog posts, commenting on others' posts or questions, and uploading documents). In the follow-up studies one year later, during which eight of the participants were re-interviewed, six of the eight used the platform substantially less than they had the year before; two used it more. The two who used it more used the platform as a closed space

to share documents that their team worked on. Many of the employees who contribute to the social enterprise platform are outgoing and constantly seek to extend their professional networks. Not all perceive personal brand management as a motivation for participation. Some perceive knowledge as a collective asset, not something that belongs exclusively to individual employees, while others contribute for altruistic reasons (Lüders 2013).

Interestingly, when employees were asked why they did not use the platform, many listed several of the same reasons that researchers on knowledge management systems in the 1980s and 1990s found, particularly lack of time and relevance for work (Orlikowski 1992, Bechina et al. 2012, Fu and Lee 2005, Bock et al. 2005, Ardichvili, Page, and Wentling 2003, Hoogenboom et al. 2007).

Work is an individual contract and measured in money

Employees in this study work in a typical billable-hour structure, although there are some variations. This structure implies that employees address several overlapping social structures, which many considered challenging. As one Norwegian consultant explained, "Consultants need to be schizophrenic. This means that, on one side, you have to be full of empathy and be on your client's side, and on the other, keep your integrity." The consultant said that although this was a typical dimension of working as a consultant, it was frustrating:

I have a work contract with my TBC entity, but when I'm working at the client's site, I experience the same schizophrenic situation in which I'm actually at the client's site, and everything I do and the value I create is for the client. But the billing of hours is in the other side [the TBC entity].

This is a situation that many of the consultants are not very comfortable with "I have a contract with [the TBC entity], but when I'm at the customer's site, I feel that I belong to the customer" as the Norwegian consultant put it. All employees' work hours are sold to customers as well as rewarded and managed individually. The CV is an important sales document for the manager in his or her process of signing contracts with clients, but the CV is also important for the employee, since it is a symbol of his or her skills that can be sold on an hourly basis. Being up to date within one's specialized field is thus important to document:

The particular course I would like to go to is just basically the latest version of the body of knowledge that I'm experiencing, so it's something that would be good for my CV; it also looks good when [TBC] is selling me to other organizations. (Man, 40+, UK)

The employee receives work assignments from and reports to his or her manager. Thus, a central part of employees' work design

is structured around the contract between the employee and the manager. The manager plays a facilitative role between the employee and the customer. Work skills are sold to the customer on a quantitative basis of time and price. The time and price model is mirrored in how the employees' work is organized: billable, produced hours, and pay. Economic incentives trump keeping up to date, sharing knowledge, and assisting coworkers in need of help, as the following interview reveals:

Yeah, we have appraisals every year, and it's [training courses] on the to-do list for my appraisal. But we are incentivized to be fully utilized: if we get one hundred percent utilization, we get a nice bonus at the end of the year. And every day you work less than that, it counts off your bonus. And training isn't a bonus, so there's less incentive to do training because it will count against you in a way. And it's something I want to do, but it's not as high a priority as maximizing my bonus. If you don't reach certain targets, you get no bonus at all. [The number of billable hours] is like minimum sixty or seventy percent a month. Last year, I got eighty percent and got a nice bonus for that, and I'm trying to do even better this year. ... But it means that you're less likely to choose to go on a training course ... Because I think people should be encouraged to go on training courses. It's not a discouragement, but it's not as strong an encouragement as the bonus. (Man, 40+, UK)

Ideally, the collective social platform should be experienced as a shared workspace where employees can help each other. Instead, when an employee in the UK was asked whether he believed it was acceptable to spend time using the platform, the work time priority seemed clear: "No, at least not if you could have spent that hour earning money instead." On hectic workdays, individual drivers triumph over collective priorities for many of the employees.



Work is structured by the clock

According to Jemielniak (2009), time is used as a symbolic universal currency and is the key to understanding several knowledge work phenomena. For instance, employers' reign over time is an important driver for software engineers going independent (Jemielniak 2009). In the future, work is expected to shift from permanent employment toward contract-based, independent, and freelance employment (Dekas et al. 2013, Donkin 2009). In this study, lack of time was reported as a constant issue. Many said that the social platform is just another object to track amid in an already hectic workday. Some did not regard the platform as a tool that could be of any help. Work is a calculation of minimum time spent and maximum output produced, as one interviewee described:

But again, [the social enterprise platform is] one of those things that's not part of what we're paid to do, and so I'll just focus on what I need to get my work done. If we could be convinced that it was gonna enable us to work even ten percent more efficiently, maybe we'd sort of invest some time in it and get it set up. (Man, 50+, UK)

In a social structure where time is a scarce resource and where work is organized and measured by the clock, many perceived using the enterprise platform for knowledge-sharing processes (e.g., helping others who call out for help or sharing insights in blog posts) as time-consuming. Established technologies (e.g., email, telephone, file server) were preferred over the social platform. As one male employee in Norway explained, "A lot of my work is, if

you like, driven by emails; I need to stay in touch and know that I haven't missed something important." Established technologies are the most efficient way to support employees' completion of work tasks in the least amount of time possible. As one employee indicated, directing a question to someone who the employee knows will have the answer or who will guide the employee to someone relevant is more efficient than asking the question in the open platform, where the question needs a fuller description.

The employees also reported that they often work outside office hours. As a female employee from Morocco explained, "We work even on the weekend, we exchange emails on weekends, and we use the phone daily." Technology enables work processes to be flexible (Kjaerulff 2010). Smart technology and email synchronized with employees' smartphones have made it possible for many consultants to work regardless of geographic or physical place. The virtual office is everywhere, blurring distinctions between work time and leisure time (Mazmanian, Orlikowski, and Yates 2013, Orlikowski and Scott 2008), and people often do more work than what is stipulated in their work contract. For example, a recent study found that respondents worked sixty-seven percent more than the average forty-three-hour workweek, according to the U.S. Bureau of Labor Statistics, and forty-four percent more than the approximately fifty-hour workweek, according to the Center for Creative Leadership World Leadership Survey Report (Deal 2013). New technologies have challenged our established notion of work.

Work is related to other individuals, local contexts, and computer systems

Many of the TBC professionals perceived the social enterprise platform as time-consuming and not relevant to their own work. Consultants explained that they chose to spend their work hours on matters that benefit their own work. Interestingly, the analysis revealed that TBC professionals work in many different social contexts such as at clients' sites, at their main TBC location, from home during the workday, and after work hours. Furthermore, TBC consultants sit physically close to others who are important for the work regardless of whether these others are TBC employees or not. Having individuals with a shared and relevant specialization nearby enabled employees to get fast replies in real time on questions that cropped up during the workday. Working close to others was not only useful and efficient, but also social. Through face-to-face conversations, the employees shared insights and helped each other with common work-related issues (e.g., a shared project). Thus, the billable-hour structure seems to differentiate between collaborating with coworkers or team members with a shared goal (e.g., finalize a project) and assisting others who are not part of their everyday work (e.g., sharing content or insights with others in the enterprise platform, helping others who requested assistance in the enterprise platform). Such everyday offline work interactions were not

considered "knowledge-sharing" by the consultants because these interactions were essential to work. Complex knowledge work requires a high degree of face-to-face interactions and conversations (Løwendahl 2005, Brinkley 2009, Orr 1996).

When consultants work on client projects over long periods, they typically receive a client email account and a laptop with relevant client systems and applications for their work. Two young engineers from Morocco, for example, were booked to their telecom client from their first day at TBC. They were hired by the entity solely because the client required radio engineers. The only time they entered the TBC office was during the job interview and the signing of their work contracts. At their telecom client's site, the engineers worked with client-related tasks, worked on the client's computer systems, used the client's internal communication platform to look for the necessary technical information, and worked with other radio engineers employed at the telecom client. The engineers explained that they were more easily reached via their client email than the TBC email, since they used it securely during their workday inside the client's firewall. Thus, the computer systems that the consultants use for work are often tied to the



local context, regardless of whether they are at the TBC office or at the client's site. For many consultants, the social enterprise platform is an isolated island outside their workday and is therefore a less relevant platform for the consultant's work purposes. To work most efficiently, the consultants use different and relevant computer systems. To make work processes as effective as

possible, software or technologies that save time and enhance productivity are chosen over platforms that are time-consuming, as many perceived the enterprise social media platform to be.

I will now discuss the main differences between the practices at play in the organization and in distributed networks.

Distributed networks: social status, free will, and intrinsic motivation

The findings show a tendency for individual drivers and work practices to triumph over collective priorities. Employees approach other individuals and computer systems that will help them get their own work done. How, then, can it be that individuals contribute content to distributed networks (e.g., Wikipedia) in their spare time without getting economic incentives in return? There are two main differences between the workplace and distributed networks: paychecks and traditional hierarchies.

Wikipedians do not receive a paycheck; their incentive structure is related to the cycle of social status credits in the community ([Forte and Bruckman 2005](#)). First, the credits are fundamentally linked to an individual's ability to act in the community and effect change by asserting claims. Second, a reward mechanism marks one's past contributions. The notion of credits exists as a reward, and credibility empowers individuals in the community. Although none of the articles in Wikipedia are signed, most have been edited numerous times by numerous people, and explicit attribution seems impossible. However, Wikipedians recognize one another and often claim ownership of articles. As one Wikipedian explained,

In some ways you get recognized, you get some respect, recognition from your fellow ... here's somebody who knows his stuff, who writes good articles and so on and so forth, and you feel happy when one of them puts a posting on your talk page. ([Forte and Bruckman 2005, 3](#))

Another study ([Nov 2007](#)) of motivational factors in Wikipedia found that the most commonly cited motives were fun (enjoying the activity), ideology (expressing support for the perceived underlying ideology of the activity, such as the belief that knowledge should be free), and values (expressing values connected with altruism and helping others). [Kelty \(2008\)](#) found that although the IT programmers he studied spent much of their time downloading, hacking, testing, installing, coding, discussing, and blogging about features of interest to their community, they did not know each other in person. Nevertheless, they had a particular form of social imaginary of their own association. The motivational logic of distributed communities is similar to that of a social group whose members share common values, norms, and language. Group members who defy the common rules are sanctioned by other group members. Social norms play a significant role in violations on Wikipedia (e.g., deleting

others' contributions) ([Piskorski and Gorbatai 2013](#)).

What distinguishes an organization from a market is the hierarchy ([Andersen 2009](#)). However, Wikipedia and other distributed networks also have hierarchies, in which authority is held by individuals who have administrative roles in the community. Because administrators are voted in, having high credibility in the community is important. Administrative powers are held by some, and the process of gaining administrative status is open to anyone who can provide a compelling image of himself or herself. This brings associations to the "big man" phenomenon in Melanesia and Polynesia ([Sahlins 1963](#)). A big man is a highly influential individual in a tribe but does not have formal tribal or other authority. Recognition is gained through skilled persuasion and wisdom. Thus, leadership is not ascribed, but gained through action and competition based on personal status. These hierarchies are different from the one we know from organizations in the working world.

[Ostrom \(1990\)](#), in her work on how to deal with the tragedy of the commons, suggested several main principles to make collaboration beneficial to individuals. An example would be the water on Madeira, a limited resource that is shared by farmers through levadas or water canals. Each farmer waters his or her crop within a specific amount of time before access to the water is blocked by a rock and directed to the next farmer. The levada is kept clean of leaves and sticks by levada hosts who also manage the water direction. Thus, the hosts play an important role as facilitators of a shared resource that is of equal importance for all farmers. In other words, it is beneficial for all the farmers to collaborate and share. [Ostrom \(1990\)](#) highlighted the importance of collective choice, participation in decision-making processes, and collective sanctions on those who violate the community rules. These principles are key drivers in Wikipedia. However, TBC had community managers that had dedicated roles to nurture employee participation. Yet, while it is beneficial for the Madeira farmers to collaborate because of the shared resource they all need, the enterprise media platform does not necessarily provide benefits for the employees' work. On the contrary, the platform was considered time-consuming. Others close to the employee or others who the employee knew could help were approached rather than relaying these questions or needs via a collective enterprise media platform.



Discussion and conclusion

The abovementioned findings have provided insights into the research questions posed in this article: What are the institutionalized practices for work—in particular, knowledge work? How do these practices correspond to the motivational logic at play in distributed networks? First, the nature of our notion of work is colored by individual organization and measurement of time and money. However, drivers at play in distributed networks are not measured in terms of quantity but quality (e.g., good work, strong reputation, high social status). Thus, individuals in distributed networks and in organizations have very different reasons and motives for their actions. Participation at Wikipedia is done voluntarily during free time, with others who share a passion for knowledge as free, and where one's social status is valued by other community members. Intrinsic motivation plays a key role for participation in distributed networks. Employees in the workplace, on the other hand, depend on economic exchange to make a living, and the work contract is based on profit and productivity—institutionalized practices that are characteristic of capitalistic paradigms derived from industrialization. Our dependency on economic incentives for living leads to inequality in authority and power distribution between the employee and the employer and thus to hierarchical differences. Whereas hierarchies in the workplace operate to control and manage the organizations' internal resources with the aim of sparking productivity and profit, hierarchies in distributed networks are related to social status, and social norms play a significant role in the distributed community.

Second, employees use technologies that make their work more efficient. Calling or emailing others who can provide fast answers is the most effective way of getting complex knowledge work done. Sharing knowledge and assisting others via the enterprise platform is considered by the knowledge professionals as a time-consuming process. Help is provided much faster by directly asking others face to face or via telephone and email than by asking questions on company internal collective platforms. Employees are knowledgeable agents (Giddens 1984); they choose problem-solving actions that get the maximum work done in the minimum amount of time.

Thus, agency in the workplace and agency in distributed networks are different, with different practices at play. Yet, collective and engaging actions are expected from employees with the introduction of social platforms. This expectation appears to be a logical contradiction. To return to the Yir Yoronts as a metaphor, we cannot

introduce the steel axe to employees and expect them to play by the stone axe's symbolic meanings and rules when the social structure is fundamentally different.

To sum up, social media platforms have been introduced to today's workplace to foster the same collaborative tendency found in distributed networks such as Linux and Wikipedia, to create productive and advantageous behavior among employees (Dignan 2008), and to increase productivity (Chen 2011). However, most organizations fail to make employees use social enterprise platforms—at least in the expected active, knowledge-sharing manner—and the expected success of these media platforms is still pending (Chen 2011). One explanation for this unrealized goal is that social platforms do not correspond to how knowledge work is organized, measured, and rewarded in practice. We must reexamine whether mass collaboration in the workplace is a realistic goal, and whether it should be a goal in the first place. First, with the division of labor, modern workers have become increasingly specialized. Knowledge workers have different specializations (e.g., cloud computing, telecommunication, programming, project management); thus, they belong to different communities or "tribes," often across company borders. Organizations do not have the same mass of people as the Internet has (Levy 2009), which is a critical factor for mass collaboration. Second, although the twenty-first century has been characterized as networked and knowledge-intensive, in most organizations and enterprises, the notion of work is still organized on principles that have evolved alongside the process of industrialization and mass production: production of the maximum number of standardized products within the minimum amount of time. Fundamental principles (e.g., work contract, clock time, economic rewards) are practices born in a capitalist paradigm. The practices at play in the workplace and in distributed networks differ in several ways, and the findings in this study suggest that the goal of creating a mass collaborative workplace by introducing enterprise media platforms in the organization could prove difficult.

This study is not without limitations. The findings presented here are from a multinational consultancy company characterized by a billable-hour structure that organized the employees' daily work. Researchers should further study organizations with different organizational structures, organizations that nurture intrinsic motivation as important drivers for working, and organizations where employees can choose how to use their work time (e.g., Google).

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BOOK REVIEWS

Anticipating Interruptions - Security and Risk in a Liberalized Electricity Infrastructure

Antti Silvast. Unigrafia, 2013.

by Björn Wallsten

Paul Edwards, historian of technology, once wrote: "perhaps 'infrastructure' is best defined negatively, as those systems without which contemporary societies cannot function" ([Edwards 2003, 187](#)). Given such a pivotal but backstaged role in the technological machinery of modernity, Finnish sociologist Antti Silvast chose topic wisely for his dissertation *Anticipating Interruptions - Security and Risk in a Liberalized Electricity Infrastructure*. The risk dynamics of infrastructure provision open up several possibly juicy empirics in a world of malfunctioning infrastructure systems where the task to make sure that things don't malfunction, i.e. black out, is of course of significant strategic importance.

There is a definite set of virtues with Silvast's dissertation, as he goes at it from a cross-disciplinary angle of history of technology combined with risk sociology and a distinct flavor of market-oriented STS. The dissertation is methodologically rich and empirically vast, as it in sequence accounts for the Finnish "security of supply"-history using policy documents and participatory observations at electric infrastructure security seminars (chapters 4 & 5), describes the socio-material market practices in two electricity control rooms using a semi-ethnographic approach (chapters 6 & 7), and surveys lay Finns' blackout awareness and preparedness measures (chapter 8).

As Silvast is a bona fide sociologist rather than historian, the most intriguing analysis is served as we are allowed into the control rooms of a Finnish utility company. Because of Silvast's previous career in the electricity sector, these sections are not only an example of what access to an enclosed location can bring to social research in general but more specifically reveal seldom displayed inner mechanics of the amalgamated techno-economic assemblage that is our contemporary electricity system.

For someone interested in becoming an active agent on this market, e.g. in becoming a prosumer (producer/consumer) by installing solar panels, these chapters provide discouraging news. The market machinery is far from a lean and straightforward process of buying and selling, but instead a complex apparatus forcing utility companies to hire a stockbroker-trained workforce on a 24/7 basis. It is furthermore not one but two markets (Elsport and Elbas) that must be surveyed online on fourteen synchronized real-time screens, requiring continuous work in shifts. The key ingredient in the control room work practice is thus hours and hours of monitoring while staying alert to any alterations among the predictive indicators. The chances for a small seller to get the best price for her or his produced electricity in such a market configuration seem

slim, not the least since there is information that in many cases are for the utility companies' eyes only. Using software based market devices does not seem to be an option either, as one of Silvast's informants reveals that "they have not succeeded in developing reliable prediction software for this (work). Something was developed recently, but it did not turn out to be better than we are." (p.126).

On the more critical note, I have one remark on Silvast's conceptualization of risk and some general reflections on his central topics of liberalization and infrastructure risk.

If, as Silvast does (p.167), you interpret your respondents as being engaged in risk management activities regardless of whether they themselves acknowledge this or not (i.e. they might not speak of their own actions in terms of risk management), then this should be accompanied with a careful operationalization of the ambiguous risk concept to know what counts as a risk management activity and what does not. Such an operationalization would have been beneficial for the thesis, since the risk conception as it reads now fluctuates between the different sites of investigation and comes across as first and foremost a messy practice enmeshed in habits, discourses and quasi-objects.

Let me exemplify. In technical terms, risk is often defined as the likelihood of a disruption occurring multiplied by the damage the disruption inflicts in societal terms. From this follows that risk mitigation is a two-front endeavor; you might take measures that decrease the possibility of disruptions occurring (equivalent to increasing the robustness of an electric grid to prevent critical events from happening), or you might take measures to decrease the magnitude of disruptions (equivalent to increasing the resilience of an electric grid to mitigate the critical events' consequences). In practice, it might be hard to distinguish risk management measures in such dualistic terms, but they are nevertheless conceptually different strategies that are differentiated in strategic documents concerning electricity security (cf. the Swedish definition of "security of supply", comparable to the Finnish "huoltovarmuus"). While Silvast rejects such a technical conceptualization (p.14), he recognizes (p.149) the phase-approach to disaster and crisis put forward by Perry ([2007](#)), according to which a crisis first escalates, then occurs, and is lastly followed by a phase of recovery. Notably, this approach acknowledges the importance of differentiating between the before and after of critical events in the same way that the technical conceptualization of risk does. In risk management terms, the phase-approach can easily be transposed to matters of robustness (corresponding to the prevention of crisis escalation)



and resilience (corresponding to improving the recovery process after the event has occurred).

Given a more pivotal role in the assessment, an emphasis on the robustness/resilience parlance or a more thorough use of Perry's phases could have ameliorated the analysis in three different ways:

First, it could have sharpened some of Silvast's sometimes too vague interpretations. For example, a quote from the CEO of an electrical company: "Major blackouts are rare, but still possible and if they occur, lacking preparedness and anticipation could mean that we shall really have fatalities." is interpreted by Silvast as "To him, the prevention of major blackouts was hence all about improving human vitality and health." (p.87). When the CEO here speaks in resilience terms (i.e. preparedness for the recovery phase of blackouts), Silvast's conclusion concerns robustness (i.e. prevention of the escalation of blackouts), which is imprecise.

Second, it could have enabled a comparative analysis of the differences between managing what Silvast without very explicit explanations terms "market based risks", "technical risks", "security risks" and "financial risks" (cf. p.143).

Third, it could have added a dimension to Silvast's description of the Finnish "security of supply"-history of how risk management is historically contingent, and how major changes in risk management strategies tend to correlate with the occurrence of critical events. Some examples of this are explicitly mentioned, as Silvast for example recognizes that World war II and the energy crises of the 1970's had bearing on the national Finnish risk awareness, whereas the critical events that have occurred since then are given much less importance. The two major storms "Pyrä" and "Janika" that struck the Finnish grid in 2001 are for example never linked to the increased attention to risk management policies by the Finnish government in the early 2000's, and we are not served any blackout frequency statistics to get a picture of how the Finnish dependence on the availability of electricity have increased over time and how this is correlated to an increased criticality of blackout events. A description aware of the differences between robustness/resilience-measures could have distinguished between how priorities in risk management strategies display paradigmatic characteristics over time.

The reason for why this third point is important relates to the larger picture of liberalization and risk in electric infrastructures, which leads me to some concluding remarks on Silvast's dissertation as a political project.

Most explicitly, it is the control room parts of the dissertation that reveal Silvast's political stance as revelational rather than normative. As such, it is similar to market-sociologist Donald McKenzie's (2009: 184-185), in that it aims to describe the nuts and bolts of market mechanics with the ambition to make them public knowledge, rather than taking an explicit pro- or anti-market

stance. While such a research positioning is a matter of personal judgment, it comes across as slightly misguided when Silvast attempts to disavow marketization as a scapegoat that gets the blame for causing blackouts (p.94), by scaling down the issue to a matter of how insurance based market mechanics play out in electricity control rooms. Such a limited perspective might of course be interesting in itself, but is not sufficient to paint a nuanced enough picture of blackout responsibility and infrastructure risk management at large. Concerning this, I believe that Silvast fails to recognize the paradigmatic changes in risk dynamics caused by the marketization that are for example detectable in the technical provision of the electric grid. The Swedish case provides interesting insights in this respect.

A systems analyst at the Swedish Energy Agency once stated that "Security of supply-wise, I would say that Sweden peaked in 1985" (Berglund 2009), i.e. in a time when risk management was a state responsibility in a monopolistic system. In robustness-terms, the energy system then produced more than enough electricity (the last two of Sweden's twelve nuclear power stations had recently been installed) while maintenance was prioritized to an extent that allowed for preemptive measures to keep the grid in good shape. In resilience-terms, the power reserves were extensive (with regards to installed capacity) as well as diverse (they relied on different kinds of fuels). In relation to such a backdrop, liberalization could thus be argued for based on the fact that the monopolistic configuration was indefensibly expensive and inefficient. A case for deregulation could thus be made by emphasizing the so-called "over-maintenance" with co-joined arguments on how private actors would lower the total costs of electricity provision through efficiency measures.

Such measures were also implemented after the Swedish deregulation, as the robustness since then has decreased in a system set to run closer to its limits (Berglund 2009) and as short-term procurement contracts has been introduced to cut maintenance costs (Wallsten 2013). Based on the Swedish experiences some twenty years later, there is reason to argue that such a short-sighted mindset has shifted infrastructure risks forward in time as system parts installed today will have shorter life spans and break down more often since they are installed under severe time- and cost-pressures and run with higher loads than dimensioned for. While these Swedish observations of decreased system robustness can only be affirmed in the future, they outline a shifted risk management dynamics directly related to the deregulation of the electricity system. In essence, the privatized configuration requires a revision of risk management writ large, not the least given the plethora of new actor constellations, contract agreements, decreased possibilities of centralized planning etc. The mechanics of such rearrangements are unfortunately left out of Silvast's description, resulting in the loss of an important contextual aspect and a backdrop that would have corresponded well to the promises made by the dissertation's subheading: "security and risk in a liberalized electricity infrastructure".



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Northscapes. History, Technology, and the Making of Northern Environments

Dolly Jørgensen and Sverker Sörlin (eds.), The University of British Columbia Press 2013

by Kari Aga Myklebost

Antologien *Northscapes* tar opp forholdet mellom naturbetingelser og samfunn i nord, nærmere bestemt interaksjonen mellom disse, slik den framtrer i ulike menneskelige tilpassinger til nordlige forhold gjennom teknologiutvikling og sosial organisering. I innledninga argumenterer redaktørene for at det trengs slike perspektiver på nord, som en motvekt til en historiografisk tradisjon hvor nordlig klima og natur i stor grad har blitt framstilt som en nærmest deterministisk faktor, som har begrenset kultur- og samfunnsutvikling. Selve skapingen av nordlige landskap, både i fysisk og i overført eller kulturell betydning, er altså et hovedtema i boka. Hvordan har menneskelig aktivitet skapt og omskapt den nordlige naturen, og hvilke bilder av nord har blitt til i disse prosessene? Og motsatt: hvordan har nordlige landskap formet kulturer? Gjennom sine elleve artikler, samt en innledning og en epilog, utvikler boka dette interaksjonsperspektivet, og gir innblikk i ulike historiske prosesser fra det sirkumpolare området som viser hvordan nordlig natur har blitt håndtert og dermed samtidig også skrevet inn i den kulturelle selvforståelsen til forskjellige samfunn.

Boka tar oss med til det europeiske, russiske, amerikanske og kanadiske nord, - og til noen spennende grenseområder mellom disse, som det nordlige Stillehavet hvor Asia og Nord-Amerika møtes. Bokas brede geografiske nedslagsfelt gjør dette til interessant lesing. Det samme gjelder det kronologiske spennet, som strekker seg fra middelalderen til etterkrigstida, med et tyngdepunkt på 1800- og 1900-tallet.

Dette er en tverrfaglig bok, med to antropologer, en økolog og en arkeolog blant forfatterne, i tillegg til et flertall av miljø- og vitenskapshistorikere. Boka er tematisk organisert, og delt inn i fire bolker som seg imellom representerer en viss kronologi, fra utforskning (*Exploring the North*), via bosetting (*Colonizing the North*) og ressursutvinning (*Working the North*) til billedskapning (*Imagining the North*). Denne inndelingen fungerer i hovedsak godt, selv om man som leser kan spørre seg for eksempel hvor grensen går mellom kolonisering/bosetting og ressursutvinning/teknologiutvikling. Epilogen har fått tittelen «The Networked North» og brukes til å trekke linjer mellom artiklene og oppsummere status innenfor det miljøhistoriske feltet når det gjelder skapingen av nordlige områder. Finn Arne Jørgensen skriver på en systematisk og overbevisende måte om hvordan disse delene av verden må forstås som gjennomvevde av transnasjonale nettverk, heller enn som isolerte og eksotiske steder (slik de tradisjonelt har blitt oppfattet); om hvordan nordområdene består av hybride landskaper, i skjæringsfeltet mellom det urbane og villmark, verken erobret eller preservert; og sist, om hvordan nordområdene er integrert i globale forbruksmønstre. Til sammen utgjør disse tre perspektivene på de sirkumpolare

områdene en motvekt til stereotypien om nord som uberørt periferi. Jørgensen diskuterer også forskjellene på og synergiene mellom et innenfra- og utenfra-perspektiv på nordområdene på en fruktbar måte, og det tradisjonelle bildet av nord som jomfruelig og eksotisk punkteres med setningen: «There's nothing special to the North in that it is not something apart from the world we live in.» Klodens nordlige områder har blitt en integrert del av den globale utviklingen, samtidig som mytene om det uberørte og isolerte lever videre. Vi må derfor make både å bevege oss bort fra eller gi slipp på de tradisjonelle forestillingene om nord, samtidig som vi må undersøke hvordan og hvorfor slike stereotyper vedlikeholdes. Epilogen fungerer som et utsyn, som på en klargjørende måte peker ut retninger for videre forskning på feltet.

Epilogens åpne og myteknusende strategi står imidlertid i en viss kontrast til formuleringer i innledningen, som er ført i pennen av bokas to redaktører. Her omtales de sirkumpolare områdene konsekvent som ett, the North (noe som også forekommer nokså hyppig gjennom boka forøvrig), og redaktørene tilkjennegir en målsetting om å skrive «a general history of the North». De skriver: «[The North] has been perceived as not holding one history but many histories, and although these have been increasingly told in recent decades [...] virtually no one has attempted a common historical frame on a professional scholarly level.» Dette vil redaktørene bøte på. Bruken av betegnelsen Nord i bestemt form entall og ambisjonen om å utarbeide en enhetlig faglig ramme og fortelle én historie framstår som forstyrrende, både i forhold til epilogen og i forhold til den komplekse empirien som artiklene samlet sett representerer. Artiklene forteller leseren at nordområdene til tross for sin felles geografiske beliggenhet innenfor den nordlige himmelretningen er mangefasetterte og på ingen måter en unik, enhetlig region. Også bokas tittel, hvor «Northscapes» og «Northern Environments» omtales i flertall, står i kontrast til ambisjonen om å skrive om Nord innenfor en enhetlig faglig ramme. Redaktørene argumenterer for at fra et miljøhistorisk perspektiv har en samlet behandling av «the North» noe for seg; de sirkumpolare nordlige områdene har blitt tildelt noen fellestrekk fra naturens side, som mørketid, kulde og store kontraster mellom årstidene. Redaktørene nevner også tynt befolkningsgrunnlag og store hav- og fjellområder som sentrale fellestrekk. Men noen systematisk diskusjon av i hvilken grad dette borger for behandling av de nordlige områdene som ett, blir ikke tatt. Dermed lurer det tradisjonelle mytologiserende utenfra-perspektivet på nordområdene bak bokas artikler. Noen steder kommer dette fram i klartekst, som når det hevdes at den nordlige naturen skapte et særlig tett bånd mellom folk og landskap på øyene i Nord-Atlanteren i middelalderen. Hvilke levninger fra fortida tilsier at øyfolk i nord har vært tettere knyttet til naturen enn øyfolk andre steder, for eksempel i Polynesia?



For hva er egentlig felles for de sirkumpolare områdene, og i hvilken grad er det formålstjenlig å skrive om nord som én region, fra et miljøhistorisk perspektiv? Redaktørene viser i noteapparatet til arbeider som har tatt opp framveksten av Arktis som en egen region på det internasjonale planet, med mellomstatlige politiske organer og institusjonelle rammeverk, men naturlig nok er det ingen av boka bidrag som drøfter dette. I stedet holder de seg på det kulturanalytiske og miljøhistoriske planet, og diskuterer framveksten av ulike forestillinger om nord. Dette reflekteres også i redaktørenes definisjon av «Nord», som en forestilt geografi (a space imagined), og som del av den kollektive identiteten og mentaliteten (state of mind) til de som bebor nordlige områder, som har oppstått i samspill med nordlig klima og natur. En mer håndfast diskusjon av ulike parametre for nordlighet, som Louis-Edmond Hamelins klassiske drøfting fra 1978, avvises til fordel for det subjektive, opplevde nord.

Selv om man kan snakke om særegne naturforhold og klimatiske betingelser i det sirkumpolare nord, viser artiklene i Northscapes i klartekst hvordan «det samme» miljøet innenfor den enorme nordlige himmelretningen har åpnet for svært ulike kulturelle og teknologiske tilpassinger. Denne leseren kunne ønsket seg noen flere komparative linjer mellom artiklene, også innledningsvis, som drøftet dette mangfoldet i klartekst.

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Reproductive Medicine and the Life Sciences in the Contemporary Economy. A Sociomaterial Perspective

Alexander Styhre and Rebecka Arman. Gower 2013.

by Manuela Perrotta

The book by Alexander Styhre and Rebecka Arman explores assisted fertilisation (AF), a branch of reproductive medicine, from an organisational perspective. Based on interviews with professionals working in private and public clinics offering AF in Sweden, this book represents an in-depth case study of this field in a Scandinavian context. As explicitly stated by the authors, offering an organisational perspective on AF and exploring the distinctive traits of the Swedish/Scandinavian context are the two main goals of the book.

While reading the book, I was curious about the use of the label assisted fertilisation instead of the more commonly used term assisted reproductive technologies (ART). The authors claim there was a transition from the adjective 'artificial' (broadly used in the past) to the less detrimental 'assisted', but they do not provide an open explanation for focusing on fertilisation. Although this could be interpreted as a minor linguistic issue, I believe it is rather relevant as they adopt a sociomaterial perspective ([Orlikowski 2007](#)). The latter is an increasingly popular approach in recent organisation studies, and it particularly fits this case study. Focusing on sociomaterial practices allow the authors to explore AF as the space in which the social and the material overlap. Convincingly, the authors do not focus on technologies (e.g. ART), but rather direct their attention to what is the core practice in clinics from an organisational perspective: the fertilisation process.

As they argue throughout the book, clinics providing AF are not isolated loci where fertilisation is accomplished. In exploring AF from an organisational point of view, the authors do not limit their gaze to organisational and work practices. The book has a clear STS sensibility, and it engages quite intensively with current STS debate. The empirical chapters are quite dense in the descriptions of how social, organisational, institutional and technological elements are embedded in this field. One of the aims of the book, as the authors state in their conclusive chapter, is to show 'how assisted fertilization work is precisely what is being developed in the intersection between technoscientific possibilities and know-how, social needs, and legal framework' (p. 184).

The authors start their empirical excursion from the story of the development of AF in Sweden, pointing out how this story consists of a number of heterogeneous elements. The path of AF is situated in the Swedish social context and the way in which AF moves from being interpreted as an unnecessary 'luxury health care' to a socially accepted and common clinical practice. The authors seem to participate unwittingly to the naturalisation of AF as a medical solution to unwanted childlessness (categorised as a disease in Sweden since 1997) when they use the expression 'assisted fertilization therapy'.

The Swedish case is particularly fascinating for exploring the relation between public and private healthcare, entrepreneurship and research and institutional context and clinical practice. Through extensive interview excerpts, the authors reconstruct how at the very beginning public hospital management saw this practice as a new form of experimental research on which it was not appropriate to invest public funding. Similarly, the political authorities were unwilling to provide fertility treatments as part of the general public healthcare as unwanted childlessness was not perceived as a social problem. Some clinicians decided to act as pioneering entrepreneurs, and they invested their own capital in private AF clinics to meet the demand among patients. According to the interviewees (interestingly defined in the text as 'professor and entrepreneur'), this was a trick to force public investment in this sector. To avoid a situation in which this type of healthcare was only accessible to affluent patients, the Swedish social democrat norm of health care being an equal right for all quickly provoked public hospitals to start their own clinics. Interestingly, the authors do not challenge the pioneers' point of view, which is reminiscent of the heroic narrative typical of mainstream entrepreneurship. They subtly refer to these private clinics as profitable companies, but they also describe the clinicians/entrepreneurs as more interested in research advancement than in economic advantages.

Although the authors describe in detail how clinicians in this field actively influenced policy-making, they do not see this as a linear process but rather as a mutual shaping. In another empirical chapter, they discuss how the regulatory frameworks evolved, setting boundaries for clinical work. This is a compelling story as in Sweden the regulatory framework has been continuously modified to adjust to both social needs and technoscientific possibilities. The first Swedish law related to AF was created in 1984. Since then, the regulatory framework has been amended many times. For instance, egg cell donation became legal in 2003, whereas in 2005 access to treatments was allowed to lesbian couples. Although the Swedish regulatory framework is quite liberal, three main restrictions are still in place: embryo donation, surrogacy and access to treatments for single women. As the authors acutely point out, this is an ongoing process in which social interests and institutional arrangements intersect. New modifications in the legal framework and in work practices are expected to meet emerging accepted social needs.

From an organisational point of view, this is a prime example of how organisational activities are not isolated from external society. What this case makes clear is that there is a disjunction between what is technically feasible, what professional actors wish to accomplish on the basis of their medical expertise and what



they are allowed to perform legally. Consistent with recent work in organisation studies, the development of a growing interest in the role of societal institutions is important because it shows how organisational practices are affected by wider societal influences and differ across contexts. The Swedish case becomes representative of a broader North European culture if compared with similar cases explored in different contexts. For instance, a similar study conducted in Italy (Gherardi and Perrotta 2011), where the regulatory framework did not emerge as negotiated between policy makers, clinicians and patients but was imposed by the Catholic front, illustrates that societal institutions can also have a direct bearing on organisational practices. The book shows how technoscientific knowledge, social needs and legal frameworks are mutually constitutive, and what makes AF a legitimate social and organisational practice is the capacity to organise locally these heterogeneous resources into specific organisational settings (e.g. AF clinics).

In two chapters dedicated to the work 'in the clinic' and 'in the laboratory', the book proposes an in-depth description of AF techno-organisational practices. Although these chapters are dense in the description of both the front office and laboratory practices, they do not reach a deep understanding of the topics under investigation as they browse through several themes, such as gender, emotional work, ethical issues, gift economy, manual skills, professional vision and scientific standards. This lack of in-depth analysis probably emerges from the methodological approach selected to conduct the case study. In the appendix, the authors explain that the empirical material presented in the book is mainly based on interviews with actors engaged in AF work (physicians/gynaecologists,

laboratory employees, midwives, a psychologist, a policy maker and four patients). Although interviewees describe their work practices in detail, the lack of participant observation probably explains the impossibility to engage with an in-depth analysis of these themes. However, this represents only a partial weakness of the book as the authors are able to link the diverse subjects, providing an overview of AF work in Sweden.

Finally, as the authors claim, the book represents an attempt to introduce such a 'socially relevant' topic in the agenda of business and management studies. Building on many conceptual tools rooted in both STS and organisation studies, this book aims to make an organisation theory contribution to the study of the commercialisation and institutionalisation of AF. Explored from this perspective, AF development in Sweden is a prime case of successful entrepreneurship in the face of both uncertainty (professionals in this field are still working on the basis of partial and incomplete understanding of human reproductive processes) and hostility (success rates, or pregnancy rates, are still quite low). Exploring how different local AF practices emerge at the intersections with diverse social contexts and societal institutions is worthy of more scholarly attention and could represent the next challenge for scholars interested in both STS and organisation studies.

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Aluminum Dreams

Mimi Sheller, MIT Press, 2014

by Mats Ingulstad

Aluminum is the stuff of dreams. Light, strong and durable, it can be used for almost anything, from four-engine bombing aircraft and explosives, to electric cables, luxury cars and lawn chairs. Its versatility gives free reign to the imagination, allowing architects to assemble previously unthinkable buildings, while providing conspiracy theorists with protective headgear that can foil attempts by government agents to manipulate our brain waves. Since the discovery of industrial processes for mass production of aluminum in the late 19th century, what was once an expensive novelty metal has become one of the most widely used industrial materials. The spectacular growth of aluminum consumption led the philosopher of technology Lewis Mumford to identify it as the quintessentially modern material, enabling compactness and lightness in construction as well as the cheap transmission of electricity over long distances. A other important feature of what Mumford referred to as the modern "neotechnic" epoch, was that the material basis of an advanced society could no longer be confined within national or even regional borders, but required mobilization of resources on a "planetary" scale (Mumford 2010, 230-233). This particularly applies to aluminum, as the production of the pure metal from bauxite ore requires relatively advanced technology to be used in successive stages of refinement as well as vast amounts of cheap electric power. Rarely are all of the key ingredients found in one location, and so for much of its short history the aluminum industry has been based on global value chains.

The association of aluminum with modernity, and the configuration of the global production networks necessary to sustain the industry, provides the two main thrusts of *Aluminum Dreams*. Mimi Sheller's curiosity was initially sparked by the fact that Alcoa, the dominant US aluminum producer since the dawn of the industry, started organizing cruises in the bauxite-producing areas of the Caribbean in the late 1940s. This led to a decade of encounters between the representatives of a booming US in the thrall of modern capitalism, where aluminum was smelted, sold and advertised as the metal of tomorrow, with the "slow," exotic backwardness of the areas in which the bauxite was wrested from the soil. Such encounters hold a particular significance for Sheller, who is an active propagator of "mobility studies." This approach seeks to provide a new perspective on globalization with a view to both its facilitators and inhibitors. It also includes a substantial normative component, "mobility justice," which roughly correlates to a plea for ecological and social sustainability across time and space. The "mobility paradigm" purportedly integrates spatial and social approaches by incorporating elements from Science and Technology Studies, as well as a whole host of post-modern, new media and critical theories (Adev et al. 2014, 52).

Thus fortified by theory, Sheller embarks on a quest to understand how the aluminum industry "inadvertently left us bound up in metallic threads that fused with our bodies, infiltrated our buildings, altered our way of life, and even made their silent way into our foods and medicines" (4). She moves chronologically and thematically through the history of invention and innovation in the industry (chapter 2), to the creation of new markets through military campaigns (chapter 3) and advertising campaigns (chapters 4-5). In accordance with the "mobility paradigm" Sheller relies heavily on the juxtaposition between the sluggish underdevelopment of the Global South, which provided the raw material, and the hasty modernity of the Global North, in which the end-product was consumed and the profits accrued (chapter 6). By showing the uneven development patterns reflected in the different stages of the value chain, Sheller's "aluminum dreams" are revealed to be both the hopes for - and projections of - a prosperous and utopian modernity, as well as the history of how these reveries led to pollution, social dislocation and environmental degradation. Sheller not only seeks to elucidate these problems in the Caribbean, India and the other familiar haunts of the Global South (chapter 7), but also on the frozen fringes of the industrialized North, by camping with protestors fighting against aluminum smelters in Iceland and Greenland (chapter 8). The book thereby draws attention to the negative externalities of aluminum production, conveniently forgotten whenever it is portrayed as a "green" metal, the material of choice for sustainable art and sensible sensationalist architecture (chapter 9).

The transnational approach to the history of commodities has grown in popularity over the last decade or so, in large part because it offers a neat way to trace the movements of a single commodity from its point of origin through a lifecycle of movements that may span the entire globe. The flow of commodities transcends boundaries, whether geographical, political, conceptual or methodological, giving the analyst access to an interdisciplinary array of tools to combine cultural, environmental, economic and business perspectives. Sheller aspires to write a truly transnational history, "in contrast to all of the existing mainstream histories of modern materials" (10). She frequently criticizes historian of science Eric Schatzberg, best known for his argument that it was the mystique of metallic modernity that led to the adoption of aluminum rather than wood as the technology of choice for aircraft in the era spanning the two world wars (Schatzberg 1999). According to Sheller, Schatzberg operates with a too narrow understanding of the culture and ideology of aluminum, leading him to ignore the larger economic, political, military and cultural discourses, as well as their social ordering both nationally and internationally. Sheller sets a high bar, but *Aluminum Dreams* falls short. Rather than the



promised transnational economic and cultural history of aluminum (247), the book too frequently reads like an Alcoa-centric history of US conceptions of modernity, personified by the eccentric futurists R. Buckminster Fuller and Arthur Radebaugh. A glance at the notes strengthens these suspicions, she has only consulted the archives of Alcoa, even though the archives of other US firms like Reynolds and Kaiser are easily accessible, and the Institut pour l'histoire de l'aluminium in Paris holds a treasure trove of documents and testimonies that could have provided her readers with a broader perspective. As readers of this journal are probably aware, the secondary literature is full of other examples, like Norsk Hydro, that could have been used to make many of the same arguments, whether about the importance of state support, the global nature of the value chains, or hostility against western firms in the Global South.

Aluminum Dreams occasionally confounds the reviewer. Partly it has to do with the organization of the material; it is rather puzzling to find the chapter on warfare in the section of the book labeled "The Bright Side." But it is also a matter of the prose. Sheller waxes lyrical throughout the book in a manner that inadvertently underlines the power of the advertisements and the discourse of modernity she is studying. Alcoa dubbed the first globules of aluminum produced by Charles Martin Hall the "seeds of speed." Sheller is not to be outdone, describing how "veins of aluminum quietly course through our culture, keeping the kinetic elite moving while sucking up eons of electrical power from not-so-modern-places." (9). Even a humble aluminum espresso can is the subject of apotheosis, described as a "perfect vessel" for "speeding superheated steam into a perfect black elixir of energy" (122). While the appreciation of coffee

and prose are both matters of personal taste, Sheller's interjections of first-person philosophizing can only be described as banal: "as I rest my arms on the coldly seductive brushed aluminum of my MacBook Pro, its sharp chiseled edge bites into my wrists, troubling me that there must be some sharper truths upholding the easy lightness of this wondrous technology" (237).

In the final analysis, *Aluminum Dreams* is an ambitious undertaking that does not fulfill its promise. Aluminum is a splendid choice for a transnational commodity history, but as Lewis Mumford could have remarked, such a history would have needed a broader, more "planetary" basis for analysis. The attempt to combine a critical political economy perspective with an examination of the aluminum esthetics of modernity, interspersed with field reports from Icelandic protest camps, would also have required much more stringent organization and selection of material. Such are the challenges of interdisciplinary approaches, whether they are conceived as transnational commodity histories or "mobility studies." This book will provide an interesting read for those wishing to join the ranks of the aluminati, but for those already initiated, it provides few new insights beyond the sheer number of synonyms for "lustrous".

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ABOUT THE COVER

The Collectivity Project

by Olafur Eliasson

The Icelandic/Danish artist Olafur Eliasson is known for his immersive and participatory installations, often inspired by natural phenomena and environments. The Collectivity Project refers to a series of projects where Eliasson delivered three tons of white Lego bricks to a public square, and invited the public to build their vision of a future city. This project has been instigated in Tirana (Albania), Copenhagen (Denmark) and Oslo (Norway) during the period 2005-2008. We have chosen a photo from the instigation of the project in Tullinløkka, Oslo in 2006, in a time when this part of the city was under development. As such, the project also sparked dialog about city life, urban development and public engagement.

For information about the artist: <http://olafureliasson.net>

