R. Nahuis & H. van Lente (2008), 'Where are the politics? Perspectives on democracy and technology', *Science, Technology & Human Values*, 33/5, p. 559-581.

Where are the Politics? Perspectives on Democracy and Technology

Abstract

The politics of innovation involves displacements between various interrelated settings ranging from the context of design to the context of use. This variety of settings and their particular qualities raise questions about the democratic implications of displacements, which have been addressed within STS for decades from different perspectives and along various theoretical strands. We distinguish five different traditions of conceptualizing the relation between technological innovation and democracy: an intentionalist, a proceduralist, an actor-network, an interpretivist, and a performative perspective. They differ in their concepts of 'technology', 'politics' and 'democracy'; they imply different roles for the analyst and they suggest or urge other political means. It is suggested that spelling out the differences and similarities between the five perspectives creates the possibility to overcome the limitations of any particular perspective of technology and democracy.

Keywords

Technology, innovation, displaced politics, democracy

Where are the Politics? Perspectives on Democracy and Technology

Introduction: the problem of displaced politics

The politics of technology involves displacements between various interrelated settings ranging from the context of design to the context of use. Not only parliaments, councils and forums accommodate political practices, but also laboratories (Latour 1987), experiments, demonstrations (Pinch and Bijker 1987; Rip and Schot 2002), markets (Summerton 2004), work floors (Garrety and Badham 2004,) and even households (Silverstone and Hirsch 1992) and actual use (Gjøen and Hård 2002). This variety of settings and their particular characteristics raise questions about the democratic quality of technological innovation. This paper examines these questions and the various answers that have been proposed in the STS literature.

Indeed, the deeply ambivalent relationship between democracy and technology is one of the central themes in STS of the last decades. While science and technology have helped to improve the standards of living and seem to make the world more transparent, they also challenge the common meaning of (democratic) politics (Salomon 2000). Technological innovation has been conceived of as the continuation of politics with other means (e.g., Noble 1979; Latour 1987; Pfaffenberger 1992) and this politics seems most successful when it bypasses established institutions of democratic politics (e.g., Winner 1980; Bovens et al. 1995). 'Displacements' are an inherent trait of technological innovation. This idea does not necessarily imply that the politics of innovation are undemocratic. The point is that, in order to look for more democratic innovation politics, we should try to understand the democratic merits and deficits of displacements, for example when elected governments formulate policies and mandates and delegate authority, when societal organizations deliberate with civil servants, or when users vote with their feet. In this article we will investigate the democratic implications of displacements without essentialist preoccupations about where these politics 'belong'.

The relation between democracy and technology has been studied within STS and elsewhere from different theoretical starting points concerning both 'technology' and 'democracy'. Particular meanings of 'displaced politics' reflect assumptions about the nature of technology and the dynamics of innovation processes. In general, conceptual differences will have

implications for the evaluative question and for proposals of democratic renewal. To capture such differences and to highlight the assumptions about the meaning and loci of the politics of innovation, we ask: where are the politics? The plural emphasizes that politics can indeed mean different things.

This article reviews the various STS lines of argument concerning technology and democracy and clusters them into 'perspectives'. Very much like Mannheim (1936), we see perspectives as sets of approaches that are complementary and share basic assumptions, concepts and arguments. Five perspectives are distinguished in relation to different theories about technology development. First, an intentionalist perspective is based on the idea that technological innovation entails the materialization of values by means of technological choices, via which designers and engineers play a very important role in the shaping of society. This idea has however been criticized because of the mutual dependencies, interactions and contingencies often underlying such technological choices. Social constructivist approaches to technology development, on which a second (proceduralist) perspective is based, rather emphasize these aspects. Another response to intentionalist reasoning is actor-network theory. An actor-network perspective also emphasizes the importance of interactions and network formation in the development of technology, but extrapolates these mechanisms to explain the emergence of hegemony in general. Arguably, this view has far-reaching consequences for democratic evaluation of innovation processes. A fourth (interpretivist) perspective is based on the reflexive turn in STS. Self-application of insights from social studies of science inspired the exploration of the role of ambiguity, rhetoric and network formation in STS themselves. In general, the reflexive turn has called attention to the discursive dimension of socio-technical developments. A last (performative) perspective builds on insights from actor-network theory, but specifically highlights the constraining and enabling conditions of settings. Due to this focus on settings it is particularly promising for our purposes and hence considered as a perspective on its own.

This paper explores the democratic implications of these five theoretical perspectives. What roles are implied for the analyst? What political means do the perspectives suggest or urge? And on a theoretical level: how do they differ in their concepts of 'technology', 'politics' and 'democracy'? Clearly, the distinction between these perspectives is not meant to describe a history of STS, which would have to include a much more comprehensive set of sources. Our purpose is to reveal the diverging theoretical assumptions and the use of the same concepts for different phenomena; we ultimately aim at a contribution to a more consistent evaluation of the politics of displacement.

The intentionalist perspective

One of the most encompassing efforts to draw attention to the political dimension of technology is *Technopolis* by Calder (1969). Technopolis, he argued, should not be feared but steered. We already live in a society that is continuously changed by science and technology, and we should start to understand the mechanisms responsible for these sometimes dramatic changes. Authors like Calder effectively put the idea that technological innovations are not innocent or neutral in their social consequences on the agenda. This is one of the shared assumptions in most STS studies on democracy and technology. However, the idea that technological actors are privileged to direct these consequences is typical for what we label as an 'intentionalist' perspective. Winner's (1980) famous case of the Long Island bridges provides a telling example. According to Winner, the architect of the bridges, Robert Moses, deliberately designed these bridges very low in an attempt to restrict access to Jones' beaches for poor and black minorities, who normally used public transport those days. Winner's claim is that technology has inherent capacities to act, though technological actors can strategically direct these capacities. This idea finds its parallel in Noble's analysis of the role of technology in the rise of corporate capitalism (Noble 1979). Noble discussed how in the twentieth century rise of corporate capitalism the introduction of machines and other systems were political tools in the struggle between the industrialists and unions. These and similar cases raise a specific kind of question about the relation between democracy and technology: to what extend should decision-making about technological development be subjected to arrangements for democratic politics?

The intentionalist perspective draws attention to the forms of power and authority that technology developers materialize in artifacts. Typical questions are whether outcomes of design and innovation process are in conformance with the ideals and values of democratic societies. Do artifacts treat citizens equally? How do they affect basic rights? In another example, Winner (1980) quotes Mumford when he compares the politics implied in nuclear energy with the politics implied in solar energy. Nuclear energy, they argue, is more compatible with a bureaucratic organization of society due to the requirements it poses to its way of operation, whereas solar energy is more compatible with a democratic organization. Illich (1973), a philosopher of the same mind, argues that many typically modern technologies turn into a threat of widely accepted values as soon as they come to dominate alternatives. Automobiles create distance, since they render space scarce; schools create illiteracy, since they monopolize a specific kind of knowledge. In questioning the political qualities of

artifacts, authors like Winner, Mumford and Illich have inspired the alternative technology movement. The ambition is to assess and evaluate seemingly promising technological paths, to explicate the (hidden) design criteria, and to propose alternatives. The idea is to derive criteria from the domain of human affairs and to apply these to the domain of technology. Sclove (1995) proposes a 'provisional system of design criteria for democratic technologies'. He finds, for example, that technologies should not establish authoritarian or hierarchical social relations, should not promote ideologically distorted or impoverished beliefs and should be compatible with egalitarian political decentralization and federation. Solar energy, then, is suggested as an alternative to nuclear energy; and infrastructures should facilitate instead of restrict the movements of less mobile people. The political means that the intentionalist perspective suggests are the social control of technology, technology assessment, redirection of design activities and public involvement in decision-making (Boyle, Elliot, and Roy 1977).

An intentionalist perspective is highly relevant for the criticism of centralized power and hierarchical structures in the context of design. Under these conditions, elitist values can be materialized in design process and realized via artifacts. The intentionalist perspective thus learns what is at stake in questions about the acceptability of new technology and why there is an urgent need for technology assessment. When, however, not the acceptability of technology with relatively clear societal implications is in question but rather the consequences and legitimacy of displacements in decision-making, then one should primarily elaborate on these decision-making practices themselves and the settings where these take place. This begs for another kind of evaluation.

The proceduralist perspective

Whereas the intentionalist perspective assumes technology to be deliberately designed for predefined ends, others take uncertainty as an inherent trait of technological development. One of the reasons why technology assessment failed to meet its expectations was that many predictions were severely contested or just did not come true (Smits and Leyten 1991). This constrains intentionalism in design. Also value pluralism is at odds with the intentionalist endeavor to judge about the value of technologies unless these judgments are based on broadly shared values. Even Winner concludes, after attempts to base judgments on 'nature', 'risks', 'appropriate technology', and 'decentralization', that "the inquiry we need can only be

a shared enterprise, a project of redemption that can and ought to include everyone" (Winner 1986, p. 163). This translates the question of democracy to: how to interfere (democratically) at the right places and the right moments? Instead of criteria for design, the focus shifts towards procedures for involvement; hence we may speak of a 'proceduralist' perspective. Democracy becomes defined in terms of participation, deliberation and consensus seeking (Sclove 1995; Bijker 1997, 1999; Hamlett 2003).

Constructivist studies show how technology develops in complex interactive processes, in which a heterogeneous set of actors and aspects play a role. According to Bijker (1999), it is only a small step from social construction to politics. Indeed, politicization is a clear feature of constructivist studies as interests become apparent, normative assumptions are clarified and relations of power show up. The Social Construction of Technology (SCOT) approach start from the assumption that artifacts are flexibly interpretable: different social groups attach different meanings to artifacts under development and one cannot predict on beforehand which meanings come to dominate others. Closure only occurs in a 'micro-politics' of heterogeneous action and coalition formation; goals and meanings get shaped through interactions and learning processes (Pinch and Bijker 1987).

But politicization is not democratization unless equality among participants is acknowledged. Democracy requires additional means. When Bijker (1997) argues for democratization of the technological culture, he claims that there is no a priori distinction between experts and lay people from a social constructivist point of view. Everybody is expert in some aspects and lay in others; expertness is a negotiated attribution. When relevant social groups (including citizens, organizations, architects and engineers) participate in committees, advice groups and vote sessions (to which they ought to have opportunities), then this should principally be on an equal base and the outcomes are the result of shared responsibility. In this tradition, several authors have proposed criteria for evaluating whether individuals with diverse or opposing values and preferences can reach an aggregated, reasoned, informed, consensual judgment when they get a fair opportunity to discuss controversial issues (Rowe and Frewer 2000; Hamlett 2003; Rowe, Marsh, and Frewer 2004). Such criteria define a process definition of democracy, particularly when applied to political innovations like consensus conferences and dialogue workshops. Democracy, in this perspective, is understood as a deliberative practice with strong participation. By sharing preferences and interests among participants, mutually listening and proposing solutions, it is assumed that partial and private interests aggregate into solutions that are acceptable to everyone (Sclove 1995; Zimmerman 1995; Bijker 1999; Hamlett 2003). As Hamlett states: "The expectation is that the participants will find their

ideas, preconceptions, and eventually their preferences changed and molded by the experience, rather than engaging only in various bargaining or advantage-seeking tactics to secure unchanged goals" (p. 122).

Another example of the proceduralist perspective is Constructive Technology Assessment (CTA). This approach seeks to bridge the two tracks of promotional activities for technology development on the one hand and control and regulation on the other (Rip, Misa, and Schot 1995). By broadening the aspects as well as the actors CTA strives after strategies to manage technological innovation while including both positive and negative impacts. Impacts, however, are not conceived of in terms of consequences of technology development. Rather, CTA starts from the assumption of co-production of technology and impacts. The challenge for CTA researchers is to learn about the mechanisms of co-production and use these insights to improve innovation processes. Although CTA can be seen as a new management principle (Bijker 1999), its proposals for institutionalization do not differ much from other democratization proposals. Chances for better technology are enhanced through the organization of activities – like dialogue workshops, consensus conferences, scenario workshops or citizen reports – in which societal questions become articulated and coupled to technological development and in which actors will have to accept a shared responsibility for barely predictable outcomes (Schot 1996). CTA bets on societal learning without fixing the end terms for the learning process. As in consensus conferences or citizen juries, technological outcomes matter less than the process: interests are represented, discussions actually take place and lessons are learned.

What can the understanding and evaluation of displacements in the politics of technology gain from the proceduralist perspective? This perspective builds on constructivist criticism of technological determinism and thereby points to the conditional role of settings and procedures. If designers and engineers indeed harm societal values through technological activities, then one should first of all criticize the conditions that enable them to play such a pivotal role.

The proceduralist perspective emphasizes some democratic principles and evaluation criteria for settings where technological power is developed and exercised. These criteria are derived from the ideal of direct democracy. This ideal, however, may be a bridge too far for our purposes. Authors like Sclove (1995) and Bijker (1997) argue that direct democracy has many benefits, including more equal power distribution and the relative empowerment of minorities compared to vested interests and traditional parties. But direct democracy also denies citizens

the right to hold aloof (Harbers 1996). Technological issues are often very complicated and require a certain level of professionalization. Sometimes it is more appropriate to let representatives discuss and decide in one setting while citizens take part as audience and raise their voice in due course.[1] Nevertheless, when stakeholders participate in various settings, which are mutually linked via chains of accountability, one could still draw on democratic principles like representativeness, resource accessibility, and influence. But to understand and evaluate these chains of accountability, one should focus on displacements, that is: on the complementary assets of settings where decisions are taken.

The actor-network perspective

Both the rationalist and the proceduralist perspective are concerned about normative principles, be it in terms of technological outcomes or in terms of participation in processes. Other studies that reflect on displaced politics, however, lack an external normative principle for critical assessment and recommendations. The politics of innovation in and through expanding and weakening networks is thought to be rational though amoral. Some versions of actor-network theory provide clear examples. Latour (1991a; 1991b) and Akrich (1995), for instance, assume a gradual distinction between a local and a global level. Decisions at the local level (e.g. design specifications) are intentional and rational as they can be understood if one takes into account the relations with other actors, the available resources, the skills of engineers, and other local circumstances. At a global level systems and structures acquire their characteristics through an accumulation of local decisions. Networks thus emerge as the accumulation of choices, decisions, and actions. According to Latour and Akrich the global can only be understood from the networks created by local decisions. Henceforth, global structures (electricity networks, sewerage systems, institutions, democracy) should be conceived as networks that may reach far in their complexity and geographical range, but remain local at their nodes. Macro structures are built up by micro decisions. The political institutions that we take to be democratic today were once contested political innovations and historically constructed as techniques of representation (Gomart and Hajer 2003); "the Leviathan is a skein of networks" (Latour 1991b, p. 169).

Latour's translation theory proposes a set of concepts and methods to capture the dynamics of network formation. Networks are defined by the elements that contribute to the accomplishment of an actor's action program (Latour 1987). The success of the network depends on its strength, that is, the number of allied elements that support the same action

program. An important mechanism of network formation is translation: the activity of actors to translate their own interests, purposes, problem definitions into those of others, attempting to enroll them into the network and to be able to speak on behalf of them. Latour's view on the politics of innovations is explicitly Machiavellian (Latour 1987, 1988). He considers the various strategies and tactics of successful innovators as well as their conditions and limitations, just like Machiavelli analyzed the successful paths to power. These strategies aim at enrolling others, while keeping control over their behaviors. Domination is thus a matter of enlarging and unifying networks.

Another strategy to enroll actors and control their behavior is to delegate network formation to technological artifacts (Latour 1991a). Technological artifacts sometimes are more durable substitutes for work done by (unreliable) human actors. If a hotel manager adds a metal weight to the keys of the rooms, he is more likely to have them returned than when he would have to ask his guests for this favor each time anew. The metal weight substitutes the multitude of requests and, while enrolling more guests in the action program of the manager, becomes an 'actant' in the network. Another example, according to Latour (1988) the perfect counterpart of Winner's Long Island bridges case, highlights the political dimension of delegation. At the end of the nineteenth century the municipal authorities of Paris wanted to make sure that the exploitation of the underground to be built would remain in the hands of the municipality. After a long struggle, the municipality decided to build the underground with rails too small for train wagons. This way they could ensure that private railway companies would not appropriate the underground, even when a right wing coalition would allow them in the future. Instead of contractual arrangements, more durable arrangements were made out of stones, steel and concrete. This feature of technological actants is captured with the notion of 'script': the action program inscribed in the material dimension of technological artifacts and infrastructures plays an important role in its usage: it allows, forbids, prescribes and suggests ways of use. "Thus, like a film script, technical objects define a framework of action together with the actors and the space in which they are supposed to act" (Akrich 1992).

Actor-network theory rephrases distinctions between facts and values and between technology and politics in terms of competing networks (which are themselves hybrid compositions of humans and non-humans). What are the normative implications of this conception? Technologies, networks, polities as well as their legitimizations reflect the outcome of a struggle of forces. For example, the accomplishment of totalitarianism through the construction of a network of statistics and calculations, bureaus and investigations brought

along its own (ideological) foundation (Latour 1991b). As a consequence, this also justified that Stalin's scientists created 'truth' through intimidation and isolation of dissidents (Amsterdamska 1990). An actor-network analysis of the politics of innovation cannot draw on universal norms to contest such justifications.

Is, then, the actor-network perspective irrelevant for democratic thought? On the contrary, but its political relevance is rather to propose an alternative political ontology than to evaluate a decision-making process. It does not concern techno-politics, but *techno-polities*. Instead of evaluating technological activity, it explores new divisions of power that cross-cut the old distinction between the technological and the political (Latour 2004). How should, for example, representation and accountability be redefined if they are not only to cover the responsibilities of politicians, but at the same time also those of scientists and engineers?

The actor-network perspectives brings along an interesting agnosticism that is helpful for evaluating displaced politics without pre-occupations about where these politics belong. Especially helpful for our purposes is the idea that innovation comes about in the interplay of action and antiprograms (Latour 1991a). These notions point to the political nature of innovation processes and to the issues at stake; at the same time they incorporate the idea of the politics of artifacts: whereas the intentionalist perspective highlights the contestability of technological artifacts as materializations of designers' values, the actor-network perspective sees this as one of the ingredients of the competition of networks. It thus offers a rich and dynamic perspective on the politics of innovation.

The interpretivist perspective

Whereas the intentionalist and actor-network perspective draw attention to the politics/agency of artifacts, the proceduralist perspective (the SCOT approach in particular) rather emphasizes the interpretive flexibility of artifacts. These ideas are difficult to align. For example, even if the Long Island bridges were designed with racist intentions, by now they discriminate rich people in luxury buses and camper vans more than the poor people who used to travel by public transport but bought private cars in recent times (Joerges 1999). Some deny that these bridges are inherently political: they are ambiguous at worst (Woolgar and Cooper 1999). Artifacts are like texts: their stability and societal consequences result from an alternating process in which readers interpret texts and texts configure their readers. The social construction of a particular technology, these scholars argue, goes hand in hand with the

mobilization of discourse and the creation of a moral order, myths and rituals that signify the technology-as-text and prescribe what kinds of use are appropriate, which interpretations are accurate, which judgments make sense (Woolgar 1991; Pfaffenberger 1992; Woolgar and Cooper 1999; Hajer 1995).

Within what we label as the 'interpretivist perspective' interpretive flexibility is a guiding principle, but not only for the conceptualization of technology. It is also applied to the discursive elements that signify artifacts.[2] Although discourses (e.g. aesthetic and economic argumentation for low bridges that mystify the racial intentions of the architect) are conditional for the realization of eventual political effects of artifacts and hence become another factor in the struggle of forces, they remain amenable to reconfiguration. In the words of Pfaffenberger (1992, p. 282): "the people adversely affected […] engage in myth-, context-, or artifact-altering strategies that represent an accommodation to the system (technological adjustment) or a conscious attempt to change it (technological reconstitution)".

What does this interpretivist perspective imply for the understanding of democratic quality? What are the rules for signification and countersignification? The interpretivist perspective offers a sophisticated analysis of the co-construction of hegemonic ideologies – "the political ideas that shape a polity are those that emerge from a technological crucible" (Pfaffenberger 1992, p. 288) – but how can such polity reflexively define the rules of the game? An answer can be found in the interpretive flexibility of 'democracy'. If democracy is seen as text and its meaning depends on the discursive contexts that signify it (Halffman 2003), then we arrive at a conception of democracy that is akin to Lefort's (1992) idea of modern democratic societies being fundamentally characterized by indeterminacy. His philosophical argument is simple: democracy cannot be a neutral or universal technique for the regulation of political contest, because that would imply the exclusion of contest about this technique from the political arena. Democracy refers to the way a society reflexively acknowledges the frailties of its own political institutions and finds ways to cope with the indeterminateness of proper politics and democratic legitimacy. It appreciates ambiguity and opposition, which urge for continuous re-thinking and re-institutionalization of its own practices and principles. Henceforth, democratic conceptualization is thought to be part of the legitimacy struggles in each political process. The construction of 'democratic legitimacy' should therefore be investigated with the same empirical means as the politics of technological innovation: case studies and ethnographic research. The interpretive challenge is to unravel the discursive conditions and circumstances by which a political/innovation process both leads to particular outcomes *and* is claimed to be democratic.

The interpretivist perspective has many similarities with the actor-network perspective. Both hold that technological controversies entail more than mere competition between different variations of a technology. Controversy in terms of conflicting action programs in the actor-network perspective implies that different future worlds are competing; it is both social and material at the same time. Now, the interpretivist perspective adds a discursive dimension to the social and material. It insists on the crucial importance of a signifying discourse from which the technology-as-text derives its meaning. Such discourse might explicate and shape the (political) aims that are intended by design; it might also mystify these aims. Moreover, each signification may provoke countersignification, which indeed amounts to the construction of technology.

One of the most important contributions of the interpretivist perspective to STS has been its call for reflexivity. Because also critical analyses of technologies contribute to the discourse that signifies these same technologies, the analyst himself takes part in their construction. The analyst should therefore show some reflexive sensibility, which is not uncommon in STS nowadays.

The performative perspective

The interpretivist perspective addresses the ambiguity in the ideal of democracy: the ideal itself does not prescribe its form. There are multiple possible settings for democratic politics and the legitimacy of any actual political setting has to be negotiated as much as the issue itself. The interpretivist perspective would draw attention to the role of discourse in the legitimization of settings. In contrast, some authors emphasize the role of settings in the mobilization of a particular discourse of democratic legitimacy. Levidow (1998), for example, argues in an essay on the regulation of agricultural biotechnology in Europe that in settings devised to democratize biotechnology the idea of 'democracy' in its turn is 'biotechnologized'. Procedures for public participation, safety regulation and science education set the terms for expert regulation: "In all these ways, European democracy is biotechnologized. Participatory exercises help legitimize the neo-liberal framework of risk-benefit analysis, which offers us a free consumer choice to buy safe genetic fixes. (…) If we wish to democratize technology, I suggest that we must challenge the prevalent forms of both technology and democracy." (p. 223)

The idea that the setting induces the meaning of both technology and democracy is key to what we suggest to call the 'performative perspective'. According to this perspective, the setting of activities and the framing of concepts are never passive or innocent, they *do* something, they are performative (Gomart and Hajer 2003; Hajer 2005). The very competences and capacities of participants are being shaped in a political process that is already structured in particular ways. The political setting provides information and rules to decide what it is to participate. Instead of asking '*who* participates' one should address the performative question: *what* enables participants to act the way they do? How do they acquire the competences and capacities to contest, reason, deliberate, choose?

A key concept in the performative perspective is *bias*. The idea that politics is the mobilization of bias featured prominently in political science debates in the 1960s and 1970s (Schattschneider 1960; Bachrach and M.S. 1962; Lukes 1974). This idea entails that power is not only exercised via participation in decision-making processes, but in an earlier stage already via control of the agenda. The bias of a setting is a set of predominant values, beliefs, and institutional procedures that, by admitting only safe issues to political debates, operates to the benefit of certain actors and at the expense of others.[3] This idea has recently been revitalized in STS as part of the turn to a 'politics of what'. Mol (2002) stresses the extension of the traditional view on politics as a question who can participate to a politics that includes the performative power of the setting. An extension, thus of a 'politics of who' to a 'politics of what': "Once inside the hospital, the who question is linked to, or even, overshadowed by, *what* questions. There, time and again, the question to share is: *what to do*" (p. 172). The range of possible answers to this question, one could argue, is shaped by the local circumstances of the hospital, that is: by the biases of this setting.

Gomart and Hajer (2003) use the notion of bias to elaborate further on the 'politics of what'. They review a discussion about 'good experiments' in the field of psychological experiments on rat sexuality in the 20th century. Central, too, in this discussion was the notion of bias. In one of the early experiments a male rat took a sexually 'active' role after a female rat was dropped in his cage. In contrast, later experiments, with larger cages, showed a female rat that 'actively' gave signals of being prepared to mate. The subsequent debates between conservative and feminist ethologists focused on the cultural expectations of the experimenters that were said to be materialized in the size of the cage and that biased the results. Gomart and Hajer draw another conclusion. They argue that bias is inevitable and also the larger cages interfered with the phenomenon, although differently. The behavior of rats will always be relative to constraints and facilities of the (experimental) situation. The larger

cages, however, gave the female rats a chance to behave unexpectedly and to surprise the experimenter. The question, thus, is not whether the setting is more pure and neutral, but which setting is more likely to *surprise* the ethologists, or: offers more variation/options for behavior. "In the case of the female rat, *to treat her like* an active sexual agent transforms in an unprecedented and interesting way relations between feminist ethologists, their rats, their older 'biased' colleagues, and because of the parallels constantly drawn in ethological debates between rats and humans, this proposition tentatively transforms relations between male and female humans" (p. 41).

The point of this excursion into the 'quality' of scientific experiments is that one does not need external criteria for evaluation if one emphasizes the positive role of bias. Bias can be positively employed in order to achieve surprising results. Good experiments upset business as usual. What does this performative notion of 'quality' mean in the realm of politics? First of all it means to acknowledge that bias – how a setting frames a problem, engages a certain audience and constructs the very meaning of participation – is a key concept for understanding politics. Second, the emphasis on surprise draws attention to the extent to which a political setting enables participants to turn the course of the process in unexpected and interesting directions and to reveal yet unacknowledged aspects of the issue. And third, if the bias of a setting indeed reveals certain aspects and engages certain audiences, then a democratic political process may benefit from the 'mobilization of bias', from passing through a variety of settings, indeed from the displacement of issues. Each displacement potentially offers surprising positive effects.

Because of its appreciation of displacements the performative perspective seems very promising for the approach we strive after. It does not see settings as the passive locations where the co-construction of technology and society comes about, but instead puts the role of settings in the center of analysis. The positive potential of displacements is recognized (note that displacements can also reinforce negative biases). Moreover, the performative perspective builds on the actor-network perspective – the local determines the global – when it conceptualizes the bias of settings as the prime condition for politics. It is able to incorporate insights from the interpretivist network by explaining the force of discourse from the mobilization of bias. And it shares with the proceduralist perspective an explicit ambition to democratize the politics of innovation.

In the performative perspective, however, 'democracy' does not refer to some model existing independently from the practices under study as in the proceduralist perspective (e.g., Hamlett

2003). With reference to 'surprise' it is suggested that criteria for democratic quality can be derived from the practices themselves: "Surprise […] insists that criteria are inherently *immanent* and cannot be picked a priori to guarantee outcomes" (Gomart and Hajer 2003, p. 40). However, in the analysis of Gomart and Hajer such external criteria do seem to have slipped in via the backdoor. In their case, the development plan for a multipurpose area called the Hoeksche Waard, creative experiments with political forms indeed led to the unexpected voicing of hitherto silenced 'Hoekschewaarders' (the inhabitants) among other things. But they also selected a case where creativity in political solutions happened to coincide with remedying injustice. By celebrating the first, they avoid spelling out what is involved in the second (Pestre 2004). For example, would they also celebrate 'sudden reversals' and 'unexpected turns' if these instead revealed power centralization?

Delimitation of the perspectives

The distinctions between the perspectives reveal two key issues in STS of the last decades. First, the traditional STS ambition to steer technology in socially desired directions on the one hand assumes that (technological) actors are capable of bringing about particular societal consequences. On the other hand, empirical studies also point to the ambiguity of new technologies, the contingencies in innovation processes and limitations to the predictability of societal consequences. How, then, to steer technological development when its effects are contingent? This issue reflects the identification of the intentionalist perspective, emphasizing deliberate design, as distinguished from the four other perspectives that much more emphasize contingency and interaction.

The second issue relates to the definition of democracy. Here we may distinguish an idealist from a realist political stance. Idealism *presupposes* the independent existence of principles as the essence of democracy, which determine/prescribe how proper politics is to be done. It opens the black box of 'technology', but keeps the black box of 'democracy' closed. Realism (in the machiavellian sense of RealPolitik) implies that democratic principles are co-constructions. Like technology, democracy can be studied as an empirical phenomenon. Yet, the notion of democracy cannot be used anymore to evaluate practices of co-construction if it is consequence of such practices itself. Should one fix the terms of democracy in order to take a stance, or explain the emergence and reification of democracy at the expense of evaluative ambitions? Different answers to this question mark the distinction between the proceduralist perspective and the actor-network perspective.

The interpretivist and performative perspective are amendments to the actor-network perspective rather than perspectives in the sense of being shared by broad research communities. Yet, because they significantly contribute to our understanding of the relation between technology and democracy, we consider them as if they are perspectives in their own right. The interpretivist perspective calls attention to the discursive contexts in which the politics of innovation is embedded (and evaluated). This implies that arguments for democratization, because they tend to reify a particular perspective on democracy, should also include rethinking their own normative assumptions. The performative perspective also calls attention to the context, but rather emphasizes the role of local enablers that shape actual political performances. These enablers may include material as well as discursive elements.

Conclusion

Technological change is a story of displaced politics, and in STS and elsewhere this has sometimes been diagnosed as a democratic deficit per se. However, we need a less negative conception in order to understand and evaluate the implications of displacement. The mutual shaping of technology and society takes place in a variety of settings and in all these settings contributions to democratic quality (in a positive and in a negative way) are made. This urges for a framework to theorize the democratic deficits *and* merits of displaced politics, wherever politics 'belong'.

Questions about the nature and location of the politics in technological developments and about possibilities to assess the democratic qualities have been addressed in STS. From its rich empirical tradition we reviewed some influential articles about displaced politics; we mapped the differences and complementarities of various proposed theoretical concepts and procedures that have been elaborated in almost three decades of STS. The diversity of positions has been organized into five perspectives: an intentionalist, a proceduralist, an actor-network, an interpretivist and a performative perspective. Table 1 summarizes their main features and concepts.

<<Table 1. Five perspectives on technology and democracy>>

The perspectives offer different conceptualizations of the politics of technology and means for democratization. Such differences hinge on specific interpretations of the notion of 'displaced politics'. Although it is widely acknowledged that displaced politics challenges prevailing

ideas about democracy, the five perspectives emphasize different aspects of the phenomenon. By comparing the perspectives we are able to collect the building blocks for an approach that solves our problem: understanding the democratic quality of the dynamics of displacements.

The intentionalist perspective conceives of displaced politics as social ordering through technological decisions instead of through political deliberation. This perspective yields important lessons, both analytically and politically, about the materialization of values and ideas in the design of artifacts, which explain the motivations of actors to embrace or resist technological innovation. These lessons, however, are relative to the assumption of technological determinism. When design is conceived of as a complex, interactive and iterative process, it is far more difficult to see how societal consequences can be intentionally inscribed in technological artifacts.

The proceduralist perspective conceives of displaced politics as negotiations between interdependent social groups, which (partially) take place outside established democratic settings. This perspective acknowledges the variety of appraisals of stakeholders, and embraces direct and deliberative democracy as a means for better practice. If designers indeed affect societal values through their activities, then one should democratize the conditions that enable them to play such a pivotal role. Yet, to do right to usual forms of democratic politics too, we do not adhere to the underlying ideal of direct democracy in which all stakeholders are directly involved. Nevertheless, the proceduralist perspective does bring forward a number of useful democratic principles, like representativeness, resource accessibility and influence. These principles can be used to evaluate chains of displacements when the possibility is taken into account that settings only partially contribute to democratic quality, provided that other settings compensate for their deficits.

The actor-network perspective emphasizes yet another aspect of displaced politics. In this perspective not only the issues are displaced to a variety of settings, but the politicians are also displaced by all kinds of actors, both human and non-human. The focus is on processes of mobilizing allies, through the inscription of action programs into plans, designs, and artifacts. Artifacts thus carry a script that allows and encourages others to take part in the action program. The script of technology incorporates the values and consequences inscribed in material content, though the actor-network perspective insists on the possibility that implicated actors do not take up or actively resist the roles envisioned for them. This idea of action programs contested by antiprograms offers a rich and dynamic view on what is at stake in the politics of innovation. However, the influence of settings and displacements remain theoretically underdeveloped. Moreover, the actor-network perspective does not offer a firm

ground for democratic evaluation, because it understands both innovation and democracy as constructions.

The interpretivist perspective focuses on the discursive signifiers that are to be mobilized for artifacts to have (political) effects. Displaced politics, here, means that the shaping of the terms in which socio-technical issues are framed may remain hidden or unquestioned in the settings where decisions about the issues are made. This perspective draws attention to the ways in which the consequences of technological practices are justified or mystified via interventions in prevailing interpretive categories. Signification and countersignification are therefore important factors that explain the course of technological controversies. If these notions are aligned with the notions of action programs and antiprograms, then they add a discursive dimension to the hybrids of social and material actors.

The performative perspective focuses on the way technologies and democratic practices are framed by the characteristics of settings. Like in the proceduralist perspective displaced politics means that decision-making takes place in a variety of settings next to and across established democratic institutions. The main difference, however, is that it emphasizes and appreciates the bias of settings. Bias defines who has access, how issues are framed and to what extend the public is involved; bias is thus a productive force of settings. Although advocates of the performative perspective see democratic values as immanent, attributed features, they nonetheless aim to evaluate the displaced politics of technology. Yet, it remains doubtful whether the proposed sensitivity for political creativeness and surprising outcomes suffice for that normative ambition. Instead, we suggest considering principles from the proceduralist perspective to evaluate the active role of settings in the dynamics of displacement.

To conclude, displaced politics has been a key concern for STS scholars as it points to many aspects of technological innovation that raise questions about democratic quality. However, a simple diagnosis of a democratic deficit at the level of singular settings neglects the situation where democratic quality depends on practices in multiple mutually related settings. This multiplicity and the many facets of displaced politics urge for a more comprehensive framework for democratic evaluation, a framework for which a discussion of perspectives can provide the ingredients (Nahuis 2007).

To be sure, the borders between the five perspectives are sometimes quite fluid. For example, authors who advocate both democratic technologies and democratic procedures of their development (Winner 1986; Sclove 1995) draw on assumptions of both the intentionalist and the proceduralist perspective. Concrete contributions to constructive technology assessment

are mostly proceduralist (Schot 1996), but some express a reflexive sensibility rather typical for the interpretivist perspective (Wynne 1995). Furthermore, the interpretivist and performative perspective can be seen as amendments on the actor-network perspective regarding the political realism that these perspectives share. Yet, despite these overlaps between the five perspectives there are enough differences that justify their distinction. Spelling out both the similarities and the differences, we suggest, creates possibilities to transcend the limitations of any particular perspective of technology and democracy.

Notes

[1] Four-yearly elections are one example of displaced politics: they displace decision-making authority from polling stations to parliament. But citizens may also vote with their feet in yet other related 'settings'. The massive Shell boycott in the Brent Spar controversy shows that there are other political means to participate in public affairs (Harbers 1998).

[2] Interpretive flexibility is a central concept in the SCOT approach, too, where it is used to emphasize the differences between social groups that value and interpret technologies differently. In SCOT the concept is thus the starting point for the analysis of *social* processes. In the interpretivist perspective, the consequences of the notion of interpretive flexibility for the relation between artefacts-as-texts and real texts are thought over. It is thus the starting point for the analysis of *discursive* processes.

[3] The performative dimension of material settings is perhaps most compelling in Foucault's (1975) work on the emergence of prisons.

References

Akrich, M. 1992. The de-scription of technical objects. In *Shaping Technology/Building Society: Studies in Sociotechnical Change*, edited by W. E. Bijker and J. Law, 205-24. London: The MIT Press.

———. 1995. User representations: practices, methods and sociology. In *Managing technology in society. The approach of constructive technology assessment*, edited by A. Rip, T. J. Misa and J. Schot, 167-84. London and New York: Pinter Publishers.

Amsterdamska, O. 1990. Surely you are joking, monsieur Latour. *Science, Technology & Human Values* 15 (4): 495-504.

Bachrach, P., and M.S. Baratz. 1962. Two faces of power. *American Political Science Review* (56): 947-952.

Bijker, W.E. 1997. Démocratisation de la culture technologique. *La Revue nouvelle* CVI (9):37-47.

———. 1999. Towards Politicization of Technological Culture: Constructivist STS Studies and Democracy. In *Science, Technology and Society: International Symposium*, edited by H. Ansal and D. Çalisir, 37-47. Istanbul: Istanbul Technical University.

Bovens, M., W. Derksen, W. Witteveen, P. Kalma, and F. Becker. 1995. *De verplaatsing van de politiek. Een agenda voor democratische vernieuwing*. Amsterdam: Wiarda Beckman Stichting.

Boyle, G., D. Elliot, and R. Roy, eds. 1977. *The politics of technology*. London: Longman.

Calder, N. 1969. *Technopolis: Social control of the uses of science*. London: MacGibbon & Kee.

Foucault, M. 1975. *Surveillir et punir. Naissance de la prison*. Paris: Gallimard.

Garrety, K. and R. Badham. 2004. User-Centered Design and the normative politics of technology. *Science, Technology & Human Values* 29 (2): 191-212.

Gjøen, H. and M. Hård. 2002. Cultural politics in action: Developing user scripts in relation to the electric vehicle. *Science, Technology & Human Values* 27 (2): 262-81.

Gomart, E. and M. Hajer. 2003. Is *that* politics? For an inquiry into forms in contemporary politics. In *Social studies of science and technology: Looking back ahead*, edited by B. Joerges and H. Nowotny, 33-61. Dordrecht: Kluwer Academic Publishers.

Hajer, M.A. 1995. *The politics of environmental discourse. Ecological Modernization and the Policy Process*. Oxford: Oxford University Press.

———. 2005. Setting the stage. A dramaturgy of policy deliberation. *Administration & Society* 36 (6): 624-47.

Halffman, W. 2003. Boundaries of regulatory science. Chapter 9: Technocracy versus democracy? Ph.D. diss., University of Amsterdam, Amsterdam.

Hamlett, P.W. 2003. Technology theory and deliberative democracy. *Science, Technology & Human Values* 28 (1): 112-140.

Harbers, H. 1996. Politiek van de technologie. *Kennis en Methode* (3): 308-15.

———. 1998. Technologie en politiek. Over ficties van sturing en democratisering in een technologische cultuur. *Socialisme & Democratie* (1):3-9.

Illich, I. 1973. *Tools for conviviality*. New York: Harper & Row Publishers.

Joerges, B. 1999. Do politics have artefacts? *Social Studies of Science* 29 (3): 411-31.

Latour, B. 1987. *Science in action: How to follow scientists and engineers through society*. Cambridge, Mass.: Harvard University Press.

———. 1988. How to write The Prince for machines as well as for machinations. In *Technology and social change*, edited by B. Elliot, 20-43. Edinburgh: Edinburgh University Press.

———. 1991a. Technology is society made durable. In *A sociology of monsters. Essays on power, technology and domination*, edited by J. Law. London: Routledge.

———. 1991b. *Wij zijn nooit modern geweest*. Amsterdam: Van Gennep. Translation of *Nous n'avons jamais été modernes.*

———. 2004. *Politics of nature. How to bring the sciences into politics*. Cambridge, MA: Harvard University Press.

Lefort, C. 1992. *Het democratisch tekort. Over de noodzakelijke onbepaaldheid van de democratie*. Meppel: Boom.
Levidow, L. 1998. Democratizing technology-or technologizing democracy? Regulating agricultural biotechnology in Europe. *Technology in Society* 20 (2): 211-26.
Lukes, S. 1974. *Power. A radical view*. London: MacMillan Education.
Mannheim, K. 1936. *Ideology and Utopia*. New York: Harcourt Brace Jovanovich.
Mol, A. 2002. *The body multiple: Ontology in medical practice*. Durham and London: Duke University Press.
Nahuis, R. 2007. *The politics of innovation in public transport. Issues, settings and displacements*. Utrecht: KNAG.
Noble, D.F. 1979. *America by design: Science, technology, and the rise of corporate capitalism*: Oxford University Press, USA.
Pestre, D. 2004. Thirty years of science studies. Knowledge, society and the political. *History and Technology* 20 (4): 351-69.
Pfaffenberger, B. 1992. Technological dramas. *Science, Technology & Human Values* 17 (3): 282-313.
Pinch, T.J. and W.E. Bijker. 1987. The social construction of facts and artifacts: or how the sociology of science and the sociology of technology might benefit each other. In *The social construction of technological systems*, edited by W. E. Bijker, T. P. Hughes and T. J. Pinch, 17-50. Cambridge, Mass.: MIT Press.
Rip, A. and J.W. Schot. 2002. Identifying loci for influencing the dynamics of technological development. In *Shaping technology, guiding policy*, edited by K. H. Sørensen and R. Williams, 155-72. Cheltenham, UK: Edward Elgar.
Rip, A., T.J. Misa, and J. Schot. 1995. Constructive Technology Assessment: A new paradigm for managing technology in society. In *Managing technology in society*, edited by A. Rip, T. J. Misa and J. Schot, 1-14. London: Pinter Publishers.
Rowe, G. and L.J. Frewer. 2000. Public participation methods: A framework for evaluation. *Science, Technology & Human Values* 25 (1): 3-29.
Rowe, G., R. Marsh, and L.J. Frewer. 2004. Evaluation of a deliberative conference. *Science, Technology & Human Values* 29 (1): 88-121.
Salomon, J.J. 2000. Science, technology and democracy. *Minerva* (38): 33-51.
Schattschneider, E.E. 1960. *The semisovereign people*. Hinsdale, Illinois: The Dryden Press.
Schot, J. 1996. De inzet van contructief technology assessment. *Kennis en Methode* (3): 265-93.
Sclove, R.E. 1995. *Democracy and technology*. New York: The Guilford Press.
Silverstone, R. and E. Hirsch. 1992. *Consuming technologies. Media and information in domestic spaces*. London and New York: Routledge.
Smits, R. and J. Leyten. 1991. *Technology Assessment: waakhond of speurhond?* Zeist: Kerkebosch.
Summerton, J. 2004. Do electrons have politics? Constructing user identities in Swedish electricity. *Science, Technology & Human Values* 29 (4): 486-511.
Winner, L. 1980. Do artifacts have politics? *Daedalus* (9):121-36.
———. 1986. *The whale and the reactor. A search for limits in an age of high technology*. Chicago: The University of Chicago Press.
Woolgar, S. 1991. The turn to technology in social studies of science. *Science, Technology & Human Values* 16 (1): 20-51.
Woolgar, S. and G. Cooper. 1999. Do artefacts have ambivalence? Moses' bridges, Winner's bridges and other urban legends in S&TS. *Social Studies of Science* 29 (3): 433-49.
Wynne, B. 1995. Technology assessment and reflexive social learning: Observations from the risk field. In *Managing technology in society. The approach of constructive technology assessment*, edited by A. Rip, T. J. Misa and J. Schot, 19-36. London and New York: Pinter Publishers.
Zimmerman, A.D. 1995. Toward a more democratic ethic of technological governance. *Science, Technology & Human Values* 20 (1): 86-107.

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	Intentionalist perspective	**Proceduralist perspective**	**Actor-network perspective**	**Interpretivist perspective**	**Performative perspective**
Assumptions about technology development	Rational choice Realizing means for predefined ends	Negotiation between interested social groups Co-evolution of technology and impact	Alternation of action and counteraction Network formation, alignment, enrolment	Alternation of configuration and interpretation	Practical decisions framed by settings
Assumptions about strength of technology	Materialization of power arrangements Cause of (un)foreseen consequences	Interpretive flexibility Materialization of social dynamics	Materialized (part of) action program Forbids, allows, constrains and enables	Interpretive flexibility Accommodates relational meaning	Constrains and enables, (biased) stage for action NB: including political settings and institutions
What is political about technological innovation?	Social ordering through technological choice/ impact	Rules of social dynamics	Realization of action programs, strategies to deal with antiprograms	Reification of specific interpretations about technological functionality and/or political legitimacy	Public contestation of plans, designs, etc.; public contestation of settings
Main normative problem with displaced politics	Politics bypasses democratic arrangements and institutions	Power differences in decision-making about public affairs	Problematic division of power between technological and political actors	Discursive dimension of power is often not recognized	Settings are not sufficiently or properly biased
Meaning of democracy	Set of core values and human rights	Participation, equality, deliberation, consensus Procedures for participation	'A skein of networks': set of historically contingent decision-making techniques and practices	Ambiguous, discursively realized, reflexive	Democratic legitimacy and public interest immanent to political process
Role of the analyst	Critical technology assessment	Learning about co-evolution Using lessons for improved procedures	Constructing alternative political ontologies	Interrogating practices of meaning attribution Reflection on own role	Scrutinising bias and surprise in settings Political experimentation
Implications for democratization	Alternative technology meeting democratic values	Inventing new forms for direct democracy and rational choice	Broaden actor participation, also to non-human actors	Explicate and integrate discursive framing of issues in debates	Provoking surprise via displacement and experimentation settings

Table 1. Five perspectives on technology and democracy