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On Constructive Technology Assessment and Limitations on Public Participation in Technology Assessment

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Abstract

The paper reviews selected literature on the theory and practice of constructive technology assessment (CTA), which represents a promising approach for managing technology through society. CTA emphasises the involvement and interaction of diverse participants to facilitate ‘upstream’ (or anticipatory) learning about possible impacts of technology and socially robust decision-making. The paper seeks to identify limitations of CTA, as these relate to the broadening of debate about nascent, controversial technology. In particular, it considers the relevance of CTA to the achievement of more democratic decision-making about technology. In addition, the paper directs attention towards differences in participants’ discursive capacities and rhetorical skills that may affect the role and contribution of non-expert citizens in technology assessment. The paper draws upon the debate between Habermas and Foucault to suggest promising avenues for future research based on technology assessment conceptualised as discourse. It concludes that the theory and practice of CTA may be improved by addressing explicitly possible structural limitations on the broadening of debate, whilst invoking a notion of technology assessment as discourse to point up cultural, subjective or cognitive limitations on agency.

Introduction

The language of ‘upstream engagement’ has become popular in policy circles of late. In the UK, for example, it has occurred recently in relation to the question of how to decide on the future of nanotechnology, or genetically modified crops.¹ However, policy interventions in practice to elicit greater public participation in science and technology debates and decision-making continue to be found wanting. With this in mind this paper reviews the literature concerned with constructive technology assessment (CTA), a promising approach for managing technology through society that has been employed by policy-makers in a number of countries in recent years. The paper identifies factors related to governance structure and power imbalances among actors, which impair democratic and effective public participation in technology assessment, and ultimately the social robustness of decisions made. By ‘bringing structures back in’ in this way the paper draws attention to factors that could be neglected by constructivist approaches to analysis. These relate to the ‘rules of access’, resources and power relations that impact on the capacity of diverse groups or individuals mutually to shape or design technology.² The paper also seeks to locate and to revise CTA in the light of communicative and discursive approaches to technology assessment; an extension of the approach in that direction may help to capture in analysis some factors related to agency, subjectivity and interpretation, which constrain public participation in technology assessment. The paper takes the view that one can helpfully examine typically non-ideal speech situations and the truth effects of technology assessment, to address non-rational bases of communication, without imposing the condition that it is the search for agreement, which necessarily governs the coexistence of the actors. In so doing the paper adopts a Foucauldian rather than Habermasian perspective on the issues. First, however, it is necessary to give an outline of the CTA approach and its development to date before attempting to position the approach in the context of the previously mentioned aims of the paper.

The nature and evolution of CTA

CTA represents an approach that builds on earlier insights on technology management and policy, connected with the social shaping of technology and incremental decision-making and attempts to improve the social robustness of decisions about technology.^{3, 4, 5, 6} CTA is best understood as an umbrella term encompassing a range of approaches to technology assessment underpinned by shared concerns about the emergence and control of risky or controversial technology. (Other similar approaches have been labelled ‘technology assessment’, ‘awareness TA’, ‘strategic TA’, ‘interactive TA’ and ‘participatory TA’).⁷

Theoretically, CTA is inspired by the need to resolve the dichotomy between the promotion (or benefits) of technology and the control (or harmful consequences) of technology, as discussed in earlier work by Collingridge on the dilemma of technology.⁸ CTA seeks to bridge promotion and control of technology, such that the latter is no longer merely an after-the-fact consideration, and insight about both potential development options and their impacts is acquired *ex ante*. The aim is to find ways of experimenting with technology in society (rather than in a laboratory) in order to avoid or to learn about possible harmful impacts. Three meta-level criteria of CTA have been specified:

- a). anticipation of impacts of technology, rather than reliance on response to problems associated with development;
- b). deep learning, which is necessary to bring to the surface and to clarify core values implicit in technological designs; and
- c). ‘reflexivity’ on the part of actors, which entails reflection about the roles played by diverse parties within the process of co-producing technology, and on potential avenues for improving the process of technology assessment.

Whether particular ‘generic’ CTA strategies involve ‘technology forcing’, in which specifications for controlling impacts provides the stimulus for the required innovation, or strategic niche management, through which desirable embryonic technology is protected from harsh selection pressures, the goal in each case is fulfil the aforementioned meta-criteria.⁹ A third generic strategy, ‘alignment’, pervades the CTA approach, and has been described as occurring ‘through setting up a series of experimental settings (niches) in which actors learn about the design, user needs, cultural and political acceptability, and other aspects [of the technology]’.¹⁰ The creation of interaction, in general, has been referred to as the first and most important step in any CTA process and may involve closely coordinated or diffuse interaction among participants.

Adoption of CTA in practice

Over the last twenty years CTA has been adopted, more or less explicitly, as an approach to technology assessment by public policy organisations in Denmark, in Netherlands, in the EU and by the OECD. The approach may be traced back to institutions such as the US Office of Technology Assessment and the Netherlands Organisation of Technology Assessment (NOTA, subsequently known as the Rathenau Institute). A variety of processes have been employed to improve learning about technology in society, such as consensus conferences (for example in Norway¹¹ and also in Denmark¹²), interactive technology assessment exercises (in France)^{13, 14} and science shops in various EU countries.¹⁵ Also, at the EU level, the SocRobust project has produced a technique, based in part on CTA principles, for mapping the scenarios and ‘scripts’ used by R&D managers to guide and to reflect on technology development.^{16, 17} Further, the UK’s GM Nation debate of 2003 and the New Zealand Royal Commission on Genetic Modification of 2000-1 both exemplify attempts to involve the public more directly in science and technology debates, though without specific reference to CTA. The

paper offers a critique of a key aspect of this increasingly pervasive approach, regarding the broadening of technological decision-making to include people who would otherwise be excluded from it.

Specifically, this paper utilises available literature to shed light on factors affecting public participation in decision-making about science and technology. The following section discusses a key aspect of CTA, which requires clarification and further development. This concerns both the degree CTA is committed to democracy, and possible structural, policy process-related limitations on broadening participation in technology assessment and decision-making. Following this, the third section of the paper considers how constraints on participation may also be understood by reference to a notion of technology assessment as discourse. Such an approach could highlight how differences in the discursive capacities and skills of participants may serve to narrow rather than to broaden participation, drawing on factors linked to culture, language and subjectivity for explanation. The last section of the paper provides a conclusion and summary drawing together the various strands of the paper, and implications for practice.

Democracy, Public Participation and Structural Limitations on Broadening Decision-Making

The first key issue to be addressed is linked to the recognition made in previous work that decisions about controversial or large-scale technology often reflect the dominant position and choices of certain central actors, rather than the mutual interaction and learning of the various parties likely to be affected.^{18, 19} It concerns a criticism of CTA that it fails to say anything of substance regarding the need or requirements for democratic public participation. Fundamentally, the architects of CTA consider democracy to be a secondary requirement for improving the quality of technology assessment

and decisions made. Proponents of CTA have not placed democratic criteria to the fore and doubt that others have clearly defined what they mean by ‘democracy’ in any case. Moreover, it has been observed that calls for greater participation have been wrongly assumed to improve the democracy of decision-making about technology, never mind the quality of technology.²⁰ Yet, three issues need to be considered, thinking about which informs the standpoint taken in this paper to emphasise democratic criteria. These all connect arguments to be found in the key paper on CTA by Rip and Schot²¹ with thinking and problems of emerging practice in the area of public participation in science and technology. The first concerns the ‘fundamental’ role of government in CTA to balance access to resources and influence over decision-making among different stakeholders. This could be reconsidered in terms of a questioning of the role of debates about technology within the policy process and their influence on governmental decision-making. Are exercises in public consultation necessarily merely examples of ‘playing the user card’? The second issue concerns the view that the success of CTA depends on how our societies evolve with regard to the appreciation and extension of spaces for negotiation and sociotechnical criticism. Whilst there are no guarantees regarding the quality of decisions made in accordance with democratic principles, it remains to be shown that non-democratic approaches are more effective. Non-democratic approaches, with which powerful central (sometimes governmental) actors do seem to ‘push’ unfair or harmful technology, do also have the disadvantage of breaching the expectations and values held dear in many societies. Having said this, one needs to be mindful of a third issue, which concerns the need for clear goals and criteria to guide modulation activity. As far as broadening participation is concerned Nowotny and colleagues warn that the “call for more ‘participation’ is not to be taken as a free entry ticket into an inchoate and unstructured arena of endless (and often futile) debates”.²² Thus a dilemma is presented for decision-makers and society at large. This involves how to steer between: a) insufficient public participation,

which risks the further loss of legitimacy conferred upon governmental efforts to deal with technology development on behalf of society; and b) infinite regress, the possibility of endless debate among irreconcilable parties. From Nowotny's perspective the rules to govern more distributed, democratic participation and debate among diverse contributors to science and technology development do still remain to be established. One might discern relevant criteria pertinent to issues of rule-setting, sociotechnical criticism and the proper role of government and citizens from research that has been conducted on the politics and culture of technology'.²³

The remainder of this section is concerned with structural, political aspects of technology assessment, debate or decision-making; thereafter factors which mediate and shape efforts to broaden participation in science and technology are discussed in relation to the analysis of discourse. On the first of these, insightful contributions are to be found in research seeking to facilitate the evaluation of processes employed to involve citizens in science and technology policy. Authors such as Nelkin²⁴, Rowe and Frewer²⁵ and Banthien and colleagues²⁶, have over a period of time defined a number of criteria with which to evaluate citizen participation in debates and decisions about technology. Not all of these criteria have been emphasised in CTA. Some clearly are, such as early involvement of the public and other interested and affected parties, and achievement of a balance of various interests. However, other criteria have not clearly featured in CTA, such as: the transparency of the deliberative process and use to be made of outputs from it in terms of affecting technological choice; the impact of voices not usually heard in debate on eventual policy decisions; representativeness (e.g. of groups, individuals or perspectives taking part in deliberative processes in relation to the make up and views of wider constituencies or the population at large); the legitimacy accorded to the process; and the costs of and

time spent on the process. The following paragraphs discuss implications of the aforementioned criteria for a constructive engagement of the public in technology assessment in practice.

Experience with national debates inviting citizen participation has shown a marked increase in the recognition of governments of a need to open up discussion so that views aired are more representative of society at large than would otherwise be the case, or so that the policy process might be accorded greater legitimacy. For example, a key concern of the UK GM Nation debate on commercialisation of genetically modified crops was that the general public should 'get an oar in'²⁷, so that the debate should not be left in the hands of those proponents or opponents with entrenched views of the topic. However, whilst the terms of reference for GM Nation included a wish to stimulate broader debate about GM, to inform the public about various aspects of the technology and to provide a clearer picture of public opinion of commercialisation of GM crops²⁸, its aims fell some way short of catering for the direct input of views of the public into the taking of decisions. Critics of GM Nation have focused on the extent to which the debate, though innovative, was more about application of a 'deficit model' approach to better inform citizens ignorant about GM and the winning back of public trust regarding food safety after the BSE crisis, than about allowing the public to influence public policy early enough in development to make a difference.²⁹ They have also been concerned with the implications for broadening debate of institutionalisation of such exercises. For instance public cynicism regarding the influence of the GM Nation debate on governmental policy-making has been linked to the role of the state as its sponsor and to certain governmental statements during and about the debate that appeared to undermine it. Criticisms of this type are hardly new – as studies on public inquiries into the site of nuclear power stations in the UK, the organisation and role of consensus conferences in Denmark, and the Dutch national energy policy debate of the 1980s all testify.³⁰

At the same time as calls for increased and improved engagement with citizens are becoming more common, the problem of infinite regress surfaces. A key issue in practice concerns how to reconcile the need for efficient and timely decision-making with the involvement of a representative enough sample of citizens. An interesting development that until recently appears to have run parallel to CTA has been the interactive technology assessment methodology. Here, the role of the 'TA analyst' is central to dealing with problems of participative closure. This entails action research in which the researchers involved are commissioned to set up a group to debate a particular topic; the French vineyard ITA is one such interactive social experiment.³¹ The project leaders aim to ensure satisfactory cognitive representation of the variety of beliefs related to the problem in hand, and to achieve interaction among various 'interested' and 'affected' groups. They are however mindful that the microcosm of society which comprises the interactive body is only likely to be rough approximation of the political and socio-demographic make-up of society at large. Part of the work of the researchers is to reflect on the correspondence between the interactive microcosm and the outside world, and to intervene as required. One pervasive issue is the role of consensus building in technology assessment. Some manifestations of CTA emphasise consensus and the building of shared constructions among the parties.³² However, this could be argued to come at a cost, which is the ability of citizens to 'probe' other stakeholders,³³ with possible ramifications for the legitimacy of the exercise, particularly when citizens may in any case be treated as 'outsiders' to be brought 'onside' to accept the technology in question.

CTA as Communication and Discourse

In this section the paper discusses the relevance of the concept of discourse to CTA. In general the analysis of discourse and communication in the context of technology assessment and implementation

is an aspect of CTA that remains undeveloped, although some disparate contributions on the theme have been made ^{34, 35, 36} There are three main issues which need to be addressed: the prevalence of unreasonable or strategic behaviour in discourse and communication; the images and expectations of the parties involved; differences in the discursive capacities of the actors, linked to their sense of self-confidence or empowerment to contribute in some meaningful way (to them). In addition, a broader point concerns the potential of discursive approaches to complement the structural constraints referred to above, by highlighting subjective, cognitive or cultural limitations on agency. It is helpful to compare the Foucauldian approach to social change, which focuses on discourses with Habermas' work on communicative action, to gain some purchase on these issues.

For Habermas, the process of rationalisation of society reduces the role of the public sphere within modern capitalist society, with the effect that important aspects of political and social life fail to be debated in the open by a 'reasoning' public. ³⁷ The relevance of this contribution to constructive technology assessment becomes clearer with consideration of Habermas' recognition of two fundamental human interests – the prediction and control of nature, and the achievement of mutual understanding based on undistorted communication – alongside the call for a critical theory of technology. ^{38, 39} In particular, the notion of an ideal speech situation draws attention to certain conditions that need to be present in order to reach a grounded consensus (i.e. a 'rational consensus' arrived at via the prevalence of the better argument). Briefly these conditions comprise: mutual understanding among the actors; mutual recognition of the legitimacy of other actors in the speech situation; and equal opportunity of the actors for discussion, free from any form of domination whether arising from 'strategic behaviour' or systematically distorted communication. On the other hand the work of Michel Foucault is usually seen as being in opposition to that of Habermas – more

about 'truth telling' and the prospect of difference and ongoing disagreement than the search for rationally agreed universal truths.⁴⁰ What is central, here, is the effect on individual participants of taking part in the discourse of technology assessment – i.e. the ideas, language, techniques, and knowledge commonly associated with technology assessment.⁴¹ With such participation is bound up the individual subject's sense of purpose and identity.⁴² It is through participation in discourse that the relations that might produce conflict or cooperation, dissent, compromise and actions, occur, including reinforcement of, or resistance to, prevailing dominant values in society.⁴³ Of particular relevance to CTA is the issue of incorporation of non-expert participants within institutionalised processes of assessment but also the question of how to involve citizens who can operate on an equal footing in such alignment processes. With regard to Habermas' notion of an ideal speech situation, the prospect of openness to criticism will be diminished where the argumentation process falls short of ideal, in other words, where arguments are the subject of coercion whether this arises from within the process of reaching understanding, narrowly conceived, or from broader external influences on the debate.⁴⁴ Fundamentally, Habermas' idealised notion of argumentation, and attempts to build reflective interaction among CTA participants, are negated where the participants are not orientated towards reaching understanding or consensus in the first place. This can occur, as they have done in some attempts at interactive technology assessment, when they attempt to 'strategically' influence the worldviews of others. Or, it occurs when participants are unwilling to subordinate pursuit of their own goals and successes to the 'condition that they can harmonize their plans of action on the basis of common situation definitions'.⁴⁵

From a Foucauldian point of view technology assessment, like other discourses, may be conceived as a practice in which practitioners both constitute and attempt to solve certain problems,⁴⁶ in this case

‘techno–social’ ones. In doing this, individuals tend to need certain linguistic and technical skills, or subscribe to particular ways of seeing the world, to be able to participate effectively in the discourse (this is their ‘discursive capacity’). Subjectively speaking, they feel ‘empowered’ when they are able to make such a contribution. Those who do not or cannot acquire the relevant skills or perspective may feel excluded from the predominant discourse of technology assessment, and marginalised from decision-making activity.⁴⁷ They may well become ‘self-empowered’ by dint of their participation in, or adherence to, alternative, ‘underground’ discourses of technology assessment, whether or not these are tolerated or refuted by others in the mainstream. A dynamic view of discourse suggests that the reproduction or transformation of prevailing ideas, practices and ways of seeing technology assessment could be rooted in tying together: the implementation of new deliberative, interactive processes; the identities and self-image of protagonists; and democratisation of opportunities for the expansion and reproduction of spheres of knowledge and power throughout society.⁴⁸

Central to a focus on discourses of technology assessment is analysis of language and identity in the context of oral or written communication and deliberation about the future of technologies in the making. In drawing on a critical approach to analysing discourses, future studies on CTA could address how the creation or maintenance of certain discourses of technology assessment produces inequalities of power or access which inhibit the broadening of participation, or lower the quality of related interactions. On one hand, research on the topic could make merely illustrative use of language or text to highlight aspects of narrative or different ‘framings’ underlying alternative views regarding, say, the meaning of ‘democracy’ or technological ‘progress’, labelling of GM food, or perceptions and discourses of technological risk.^{49, 50, 51, 52} On the other hand, a more ambitious extension of CTA could involve studies that rely upon close linguistic scrutiny of specific texts or conversation to

analyse constructions, interpretations and claims (of technology, risk, or benefit), which constitute social discourse and pervade struggles for and against social change.^{53, 54, 55} Of interest here is the manner in which experts use rhetorical devices to undermine or to discipline the contributions of non-experts, or identify how scientific discourse employs linguistic and textual mechanisms to ‘predetermine’ public or parliamentary debate. Whichever of these avenues is pursued a number of core research questions could be addressed. These include: how does the use of language in participatory processes produce or reproduce different conceptions, constructions, or framings of: the public, risks and benefits of technology; the role of science; and public debate and participation in science and technology? How are these conceptions inscribed in the recurrent themes, argumentation, and language conventions found in contributions to the debate in question? Broadly, a critically discursive approach would be curious to discover how language reproduces or produces struggles over the meaning and implications of embryonic or controversial science and technology. This in turn invites questions concerning whose voices are represented, whose are not, what is the relation between the protagonists, and how do they assert themselves and their positions, or control the contribution of others.

Conclusion

The approach to constructive technology assessment discussed in this paper is concerned to analyse the design and ‘directioning’ of new technological developments, and the role played by diverse stakeholders, holding different value positions, in assessments and decisions about potentially risky technology. This paper has sought, however, to clarify certain weaknesses in the approach, to discern ways to revise and to extend CTA. The paper has mounted a critique of CTA from the standpoint of two perspectives. The first of these emphasises structural factors that affect the role that groups or

individual citizens are able to play in technology development. Arguably, the orientation of CTA towards co-construction of technology underplays differences in agenda- or rule-setting capacity, influence and resources, which tilt influence over decision-making about new technology toward the already powerful in society. Here, making interventions for the (democratic) better requires structural adjustment in representation, resources or influence enjoyed by respective parties, or greater clarity about the role of deliberation in technological choice. A question mark remains about how to improve the 'reflexivity' of actors who strategise in interactive settings.

The second perspective was introduced in the context of a discussion of contributions by Habermas and Foucault, and concerned how an approach such as CTA could benefit from consideration of cultural, communicative and discursive aspects of technology assessment. The paper highlighted that in practice deliberative exercises designed by policy makers to elicit public participation are likely to feature strategic or unreasonable behaviour as individual or group interests and attitudes present in wider society endure within local interactive settings. Therefore, in practice participatory exercises may fall below the requirements of ideal speech situations. Moreover, to conceive of constructive technology assessment as discourse draws attention to issues of interpretation and subjectivity. Such a view may help to explain the 'why' of constraints on public participation, in terms of the differential discursive capacity of would-be participants to contribute to debates about technology, and the role of language in mediating interactions among various parties. A critical analysis of discourses related to technology assessment may shed further light upon the inequalities of access to debate and decision-making. A key factor in the reproduction of existing approaches to technology assessment, or in transformation towards new patterns of interactive decision-making, appears to be the relationship of current or potential future practices to the identity and self-image of participants, their capacity to

exercise knowledge and to enlarge their ability to influence matters in some way. A distinction may be made between alternative future avenues for CTA research according to the closeness with which texts are scrutinised for their linguistic content. For present purposes it is necessary merely to point out an underdeveloped but potentially fruitful area of research on CTA.

The paper has indicated two aspects of CTA that merit further attention from researchers and practitioners in the future, linked to different treatments of power in society; one appeals to the politics of decision-making, and the structures which permit or inhibit access to debate or influence over decision-making. The other refers to the power or capacity of individuals to act, possibly in conjunction with others. One of the issues not dealt with by this paper concerns the complementarity of these approaches. On one hand to try to combine political, with culture, communicative, or discursive perspectives offers the promise of a range of insights of potential benefit to the future development of constructive technology assessment, which hitherto it has lacked. On the other hand, the pursuit of such synthesis could come at the cost of neglect of underlying paradigmatic differences between the approaches. This could result in skating over differences in, say, the degree to which researchers emphasise a structural as distinct from an ideographic epistemology or methodology. Or, it could refer to the extent to which researchers seek general rules for governing public participation (e.g. ‘democratic’ principles should be followed) rather than trace the ‘truth effects’ of varying interpretations of what it means to conduct democratic technology assessment. These words of caution may temper but should not obviate the revision and extension of the CTA approach discussed above.

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