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EMERGING TECHNOLOGIES AND THE INTERPRETATIVE TURN IN TECHNOLOGY ASSESSMENT

Abstract. With emerging technologies, the role of Technology Assessment (TA) has changed profoundly. Transgressing classical ex-post TA, Constructive and Real-Time TA acquired an active role in shaping technology development. The ‘deliberative turn’ brought the incorporation of a wider set of interests through (project-shaped) participation, together with some problems. Taking the example of synthetic biology, we illustrate the ‘interpretative turn’ in addressing an emerging technology. Rather than contributing to shaping applications, TA provides the frame of reference for an informed debate, endowing meaning to an abstract technology. However, the task of interpretation often entails prior dramatization to raise sufficient interest among the public.

Keywords: technology assessment, public participation, the deliberative turn in technology assessment, synthetic biology, expert rationality

Introduction: The tasks of Technology Assessment

Today, Technology Assessment (in the following TA) has multiple tasks. On the one hand, its mission is to rationally and soberly assess technological developments and their societal implications. On the other hand, it is assigned the job of stimulating public debate on possible socio-technological futures (Petermann, 1999). In addition, it aims at concretely influencing technology policy or even technology development (Rip et al., 1995). The different tasks developed over time and supplemented the original expert-dominated TA concept.

In its early days, when the US Congress’ Office of Technology Assessment set the pace, TA was grounded in the solid belief that science ought to enlighten society. Science’s role in the then imminent conflicts on nuclear power and genetic engineering was considered that of an arbiter (Pielke,
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2007), while TA provided better options for technology governance based on deeper knowledge from diligent analyses and a wider horizon due to the interdisciplinary perspective applied (Grunwald, 2009: 1114). This TA essentially was reactive; after having studied an issue in detail, the best available scientific knowledge should be collected to draw the appropriate conclusions. Later in time, when scepticism against science grew and some people feared a growing expert dominance over politics and societal decision-making, TA took up the demands for wider public participation. It developed a range of methods to involve those that usually not get involved in processes of technology assessment (Joss and Bellucci, 2002). Going a step further, ‘Constructive TA’ (in the following CTA) aimed at involving stakeholders and users in processes of concrete technology or even product development, which implied an active role for TA rather than being a neutral observer (Schot and Rip, 1997).

These are the anchor points that characterise important tasks of TA to the present day, while the context of technology development has changed profoundly. Today, compared to the early days of TA, new and emerging technologies like nanotechnology or synthetic biology no longer provoke the same level of societal controversies – too often, not even public debates take place on their own. At the same time, today’s new technologies often lack concrete applications when a debate starts, so that they appear highly abstract while fostering the expectation of a considerable but unclear impact. Consequently, TA and related endeavours deliberately set in already at the research stage, but in doing so they run the risk of becoming ever more detached from real world technology development. Rather than playing a specific role in shaping technology (which CTA aims at), TA seems to be at risk trailing away into discourse analyses and speculative ethics (Nordmann, 2007).

Can TA acquire an ‘active role’ at all if the technology is so abstract that applications may only be faintly imagined, and if so, how? In contrast to its seeming futility, we propose that in the context of new and emerging technologies, TA indeed acquires an increasingly active role, but in a very different way. Rather than contributing to shaping a concrete technology in terms of applications, TA decisively influences the frame of reference under which an informed debate on an abstract issue like an emerging technology can take place. In other words, TA endows meaning to a technology that otherwise would be a dark horse to most people.

After this introduction, chapter two will provide a brief outline of how TA acquired an active role in technology development as embodied in Constructive and Real-Time TA and related approaches. Chapter three will be devoted to a description of the ‘deliberative turn’ in the understanding of TA and the problems of (project-shaped) participation. Taking the example
of synthetic biology, chapter four will illustrate the postulated ‘interpreta-
tive turn’ in addressing an emerging technology, emphasising the need to
provide a framework for the debate and the ensuing consequences. Chap-
ter five will take this a step further and discuss how the need for interpreta-
tion often entails a quest for dramatization.

The ‘procedural turn’: TA as a permanent activity in innovation

From its origins, TA as led by the “OTA paradigm” (van Eijndhoven, 1997: 276) was an Enlightenment project. It aimed at providing scientific, value-
free knowledge about the manifold consequences of technology develop-
ment to enhance the problem-solving capabilities of politics. This clearly
expert-driven TA model was rooted in the positivistic ideal of providing
objective information for a better, scientifically sound decision-making.
Detached from the R&D enterprise itself, TA tried to take the position as a
neutral knowledge broker not distracted by values and interests.

The positivistic, expert-centred ideal came under fire and TA underwent a
process of re-orientation and re-invention. Since classical TA often addressed
the impacts of technologies already commercialised, an important driver of
the re-orientation was the insight that any early warning function of TA, if
taken seriously, would have to be based on a closer link with the R&D enter-
prise. In addition, the Collingridge dilemma of control (once the impacts are
sufficiently known, the technology is so entrenched that there are hardly any
opportunities to change it) suggested that TA should set in at an earlier point
of innovation in order to influence the innovation process and to shape the
technology according to acceptability and societal needs.

This re-orientation resulted in new TA concepts such as constructive
TA (CTA) (Schot and Rip, 1997), real-time TA (Guston and Sarewitz, 2002)
or vision assessment (Grin and Grunwald, 2000). They all depart from the
notion that technology development does not follow a predetermined logic
but results from the co-evolution of technology and society (Bijker et al.,
1987). From this point of view, technology is considered a socio-technical
system shaped by its social context, i.e. human action and societal visions.
Against this background, TA acquired a role in shaping socio-technical net-
works relevant for the implementation of a technology to avoid negative
- and foster positive – developments. TA, in other words, adopted an active
role in innovation.

In particular CTA, originating in the mid-1980s in the Netherlands, aimed
at “broadening the decision-making processes on technological innovations
and considering impacts already during the development of technology by
involving end users and other impacted communities in the development
of technologies” (Roelofsen et al., 2008: 335). Understanding technology
development as a negotiation process had considerable implications for TA. Now, TA had to observe, to attend and to critically reflect the whole process in order to shape technology in a more reflexive way. The pertaining methodology was based on concomitantly assessing strategies of ‘technology forging’; on enabling experimental ways of developing technology not influenced by market constraints (‘strategic niche management’); and on organising feedback loops by providing platforms for public dialogue events systematically connected to the innovation process (Schot and Rip, 1997).

Obviously, the nature of TA had changed fundamentally. TA was no longer considered to engage with technology at one certain point of time only; rather, TA turned out to be a permanent activity, an on-going process accompanying concrete innovations at stake. To exert influence, TA became an actor itself, or at least “a forceful visitor” (Schot and Rip, 1997: 265).

This changing nature of TA becoming an active player in innovation had been a recurrent theme ever since in many similar approaches such as real-time TA, which aims at providing a “real-time creation of a reflexive capacity at earlier stages in the R&D process” (Guston and Sarewitz, 2002: 107). This approach – further developed into the concept of anticipatory governance (Barben et al., 2008) – traced back to the basic problem of how to better integrate research on ethical, legal and social issues of new technology (ELSI) into science policy or the R&D process. The main aim was to closely connect social scientific research with natural sciences and engineering from the outset by providing a well-elaborated methodology. Today, this kind of TA is dedicated especially to analyse public attitudes, perceptions and values by carrying out survey research, focus groups and discourse analysis to better address the early warning function of TA. By identifying possible bones of contention timely, TA contributes to an early public dialogue on possible impacts of innovation and to precautionary action; in other words, it gets proactive. In doing so, it explicitly recognises the importance of values and visions for technology development.

The idea that “(...) one way to shape socio-technological systems is through the visions that guide their development” (Decker et al., 2000: 1) has fuelled another approach called ‘vision assessment’. It focuses on the analysis of the content, the origin and the underlying assumptions of visions (Grunwald, 2004). On the one hand, being closely related to the German tradition of Leitbild assessment (Dierkes et al., 1992), vision assessment entails a critical evaluation of existing visions using scientific methods. On the other hand, with a special view to new and emerging technologies, vision assessment sometimes contributes to actively shaping visions by applying interactive methods, such as focus groups or citizen conferences, to guide society towards a desirable future. Van der Plas et al. (2010) have shown
that vision assessment can serve as an appropriate procedure to develop shared visions on the future of technology, combining the standards of an expert debate with the requirements of meeting stakeholder expectations. By developing new and more realistic visions in a deliberative way, vision assessment aims at triggering a mutual learning process resulting in opening up the perspectives and perceptions of the people involved.

To sum up, with the constructivist interpretation of technology being shaped by human action and societal visions, TA is called to set in early in innovation and to attend the whole process. TA moves from a single-stop reactive analysis to a permanent activity, which indicates a ‘procedural turn’ in the understanding of its proper role in a pro-active TA. Rather than being a distant observer making its appearance once and late, TA becomes an active player permanently present, who pursues a specific mission: TA is dedicated to monitor the innovation process, to anticipate potential conflicts and to ensure that technology development is in accordance with generally accepted guiding values and visions. In short, TA now is understood as a facilitator to make responsible innovation happen.

The ‘deliberative turn’: TA as a facilitator of public debate

In addition to the ‘procedural turn’, and due to recalcitrant controversies over contested issues such as nuclear power and agro-biotechnology, TA practitioners and theorists posed a strong emphasis on participation from the 1980s on. Various forms of procedures were developed aiming at bringing into dialogue experts, policy makers, stakeholders and the public. Over time, a methodological canon for participatory technology assessment (PTA) developed to effectively involve persons not involved in assessment procedures so far (Rowe and Frewer, 2005). Observers from the Science and Technology Studies (STS) spoke of a ‘deliberative’ (Kearnes, 2009) or even ‘democratic turn’ (Hagendijk and Irwin, 2006) in technology policy. Participatory procedures, as theorists like Callon et al. (2011) argued, could help politicizing technology issues that exclusively had been attached to closed circles so far. Additionally, STS scholars often highlighted the cognitive advantage of lay knowledge correcting or supplementing expert rationality (Collins and Evans, 2007). In a similar vein, Stirling (2008) considered new questions and options as developed in participatory procedures to be particularly appropriate for rendering a debate more comprehensive.

In the days when participatory procedures were developed and tested, the technologies at stake (such as agricultural biotechnology) were developed to a degree as to provide an idea what they were for. Today, however, participatory technology assessment (PTA) also addresses new and emerging technologies such as nanotechnology that are far less developed; often,
their supporters do not even share a common definition. In this context, talking about emerging technologies implies talking about a new socio-technical constellation. This is mirrored in the notion of ‘technoscience’, which emerging technologies often are debated under ever since Bruno Latour (1987) had introduced the term to highlight the inextricable entanglement of science and society. This entanglement determines which questions get accepted as legitimate, whose statements are deemed valid or what theories are acknowledged to be guiding. Today, the term technoscience mostly indicates that technology development does not follow basic research in a linear way; rather, principles of feasibility and marketability already influence basic research. Fundamental decisions on applications are therefore taken early during research, possibly deciding the fate of a technology for good. Initially however, it is not clear at all whether, and which, technical applications may be realized.

With a view to participation, this means that PTA has to set in early in order to influence technology development effectively. In other words, the interpretation of modern science as technoscience results in the quest for moving participation ‘upstream’. This has become particularly evident with nanotechnology: as soon as it appeared on the agenda, scholars like Wilsdon and Willis (2004) argued for upstream engagement. The central idea was to intensify public involvement through a stimulated dialogue much earlier than previously (Gavelin et al., 2007). So far, the public had been looked at according to the traditional model of Public Understanding of Science (PUS), which is inherently reactive as it seeks to inform a receiving public on established facts. In contrast, the new concept of exchange-oriented public engagement aimed at treating the public as an equal-level partner and hence, as a source of relevant knowledge to assess a technology pro-actively. In fact from 2000 on, a series of public engagement events on nanotechnology took place in several countries (Kurath and Gisler, 2009), eventually giving rise to the idea that new technologies need to be introduced ‘responsibly’ (von Schomberg, 2012).

However, moving upstream public participation to an early phase of technology development entails some problems. Participatory events usually are more interesting to the attendants if the issue to be debated is close to their everyday life, or even if not, if it is being problematized in the media. In contrast, ‘upstream’ PTA sets in when there is no cause for public controversies because there are no concrete applications that could trigger citizens’ concerns or stimulate public imagination (Gaskell et al., 2005). Consequently, the public tend to be little interested. A paradoxical situation emerges that reminds of the Collingridge dilemma: when a field of science and technology is new and decision making agendas are relatively open to influences from the public, the public’s interest in engaging with
These issues is low. The consequence is that lay people need to be actively interested and motivated to participate. On the one hand, participation is strongly required in the age of an all-embracing innovation; on the other hand, due to the abstractness or the virtual character of the emerging technologies at stake, public participation has to be pushed, i.e. actively organized from outside using external resources; in other words, it takes the form of a project.

We call this new setting ‘project-shaped participation’ (PSP). PSP entails three consequences: i) professional participation specialists, often from the field of TA, initiate and organize public dialogues and engagement procedures; ii) participation takes the form of a project funded by a third party (e.g. national or EU funding agencies); and iii) participation takes place largely without reference to existing public controversies, actual demands for participation or explicit individual concerns. To a large extent therefore, its role and function(s) remain ambiguous (Bogner, 2012).

In past technology controversies, there was no need to invite people because they organized themselves and actively demanded to be heard; the protests sometimes took militant forms as in the struggles over nuclear power plants in Germany and elsewhere (Radkau, 1995). Today, participation in debates on technology issues no longer is protest-shaped. It almost does not exist for lack of interest from the side of potential participants unless it is made into a project. For instance, the procedure of the citizen conference originally was designed to come to a sensible conclusion in a civilized way on a hotly and often violently debated issue (Joss and Bellucci, 2002). Today, the format is primarily being used to interest lay people in technology issues and to stimulate a public debate. Public engagement projects have become popular with decision-makers in technology policy. Starting from modest size, they have acquired big dimensions today: in 2006, the first transnational experiment in public engagement (‘Meeting of Minds’) involved 130 people from 9 EU member states discussing ethical and social aspects of modern neuroscience (Boussaguet and Dehousse, 2009). On a global level, the first participation experiment organized by the Danish Board of Technology in preparation of the Copenhagen Climate Summit in 2009 (Rask et al., 2011), involved 4400 people from 38 countries all over the world to discuss the implication of climate change. In 2012, a second global citizen deliberation dealt with biodiversity.

To sum up, the ‘deliberative turn’ resulted in the development of a new and partly independent branch of TA called PTA. Today, PTA increasingly comes in when emerging technologies are at stake. This implies a fundamental change in the form of expression of participation: formerly, participation demands accompanied the attempted implementation of contested technologies such as nuclear energy or agro-biotechnology that gave rise to
open protest and resistance. Today, participation in issues of emerging technologies is project-shaped and mostly aims at engaging the public. Here, TA takes another role, namely in initiating and organising public dialogue events. It aims at influencing the relationship between technology and society rather than directly shaping the technology itself. Implications for concrete technology development, however, may or may not ensue from this activity.

Thus, TA has become an active player throughout the last 25 years or so in several respects: with regard to the ‘procedural turn’ as represented by CTA or real-time TA, it conveys the interests and concerns of citizens and stakeholders to concrete technology developments. With a view to the ‘deliberative turn’ as represented by the boom of interactive methods, TA aims at shaping the context in which the technology should develop, and at co-determining the criteria and direction for its development. TA is called to identify or develop visions guiding concrete technology development, to anticipate potential conflicts over technological applications and to apply methods for deliberative purposes.

These new roles assigned to TA result from a constructivist interpretation of technology (‘co-construction’). Both the procedural and the deliberative turn, however, leave the respective technology somewhat ‘black-boxed’ – as if only the concrete applications, their development and their consequences would have to be looked at. Regarding the technologies at stake, it appears as if their nature and properties were more or less obvious, so that it was possible to talk about the technologies pretending everybody knew what they were like. In fact, if a technology to be discussed has some widely known applications already, they could provide the context for its discussion, implying antagonising interests, substantiated concerns or concrete expectations. If a technology is so new that it lacks such applications, it becomes difficult to find a context that could provide a perspective for the debate to be held.

This is the case, in particular, with new and emerging technologies. They put another challenge to TA, namely to actively search and find, or construct, a frame for the debate to come. TA responds to the challenge by a move we propose to call the ‘interpretative turn’. In the following, we will analyse this turn and its implications in more detail, taking the example of synthetic biology.

The ‘interpretative turn’: TA framing the debate about emerging technologies

Sir Karl Popper, when holding one of his famous lectures, is said to have prompted the audience: “Do observe!” The students got puzzled; how
should they observe what, and to what end? Sir Karl obviously intended to
show that it is impossible – at least in science – to observe, and communi-
cate about, the ‘thing-in-itself’. This can only be done within a frame of refer-
ce, i.e. by determining what is considered to be relevant and what to be
irrelevant.

For more established technologies, existing or immediately imminent
applications usually provide a context that is sufficient for a debate. How-
ever, in an early state of technology development – such as under the con-
ditions of ‘upstream engagement’ – only vague ideas exist on what the
technology really can be used for and what the consequences might be. If
nobody knows what the technology really is about, it cannot be debated.
From the very beginning, debates about new technologies therefore need a
frame of reference to distinguish what is to be considered relevant from the
irrelevant. In other words, frames are immensely important to enable peo-
ple to discuss an abstract issue. Frames connect this issue to previously held
debates by way of comparisons – i.e., choosing analogies and defining prec-
edents (Nisbet, 2010). Comparators and analogies are needed also to stimu-
late the phantasy of both experts and, even more important, of lay people in
order to throw up relevant issues that can be debated. This is the area where
TA actively gets involved in shaping the emerging relation between a new
technology and society.

One of the technologies that got debated in this way is synthetic biology.
It is a comparatively young field of science where biologists, chemists, com-
puter scientists, engineers and a number of other professions work together
to create biological systems that do not exist in nature. Alternatively, they
alter naturally occurring biological systems to fulfil useful tasks (Open Wet-
ware, 2014). The aim is to rapidly and exactly develop biological (so far,
mostly micro-)organisms with radically novel properties. Genetic engineer-
ing, so the aim, is to be converted into an exact engineering science (Endy,
2005). In the light of the numerous professions involved in its development
and the far-reaching expectations reared, the problem that immediately
comes to mind is: what is synthetic biology really like, and what should it be
compared with?

To stimulate a public dialogue on this issue (say, in a project-shaped par-
ticipation event), TA would need to provide a suitable perspective. But how
could this be developed? For emerging technologies, the analysis of empiri-
cally approachable problem dimensions becomes difficult. Every analysis
necessarily relies on visions and often on genuinely utopian projections.
Even the most sophisticated experts are unable to assess their potential for
being realised (Quednow, 2010). Following a rational point of view, TA has
therefore been more than reluctant to indulge into visionary or, subject
to standpoint, rather airy-fairy issues – another pertinent example would
be ‘human enhancement’. With emerging technologies, however, active dealing with vague issues becomes necessary and turns into an everyday business.

TA has adapted to this challenge by relying, in many cases, on finding analogies to other, more familiar technologies. They would propose already known perspectives of problematization that could be applied to the new technology at stake. For synthetic biology, a number of technologies suggest themselves as comparators, each opening up a particular perspective. At least three (and probably more) options can be identified: genetic engineering, nanotechnology and information technology (Torgersen and Schmidt, 2013).

**Synthetic biology as genetic engineering 2.0:** According to its founders, synthetic biology aims at genetically re-programming existing or constructing entirely novel organisms. The challenge no longer is to transfer single genes from one organism into the cells of another; rather, it is the construction of standardised genetic building blocks to be combined at will. This results in an elaborate genetic construct that performs useful tasks in a cell. NGOs therefore aim at problematizing synthetic biology as a more radical version of genetic engineering. For example, the Canadian Action Group on Erosion, Technology and Concentration critically spoke of ‘extreme genetic engineering’ in their first report on synthetic biology (ETC Group, 2007), suggesting a link to prior conflicts carried out over decades. Thus, in promoting the analogy to genetic engineering, actors suggest a high risk potential and fundamental ethical problems associated with synthetic biology implicitly inviting to embark on a conflict.

**Synthetic biology as ‘nanotechnology by other means’**: Both technologies deal with constructs in the nanometer range. While nanotechnology is considered a material science, synthetic biology deliberately reconstructs interactions within and among biochemical systems. Nevertheless, both are considered *bona fide* technosciences, while synthetic biology can be understood as a result of nanotechnology converging with genetic engineering (deVriend, 2006). With regard to governance, the idea of ‘responsible research and innovation’ (von Schomberg, 2012) was reared with nanotechnology first and is now also applied to synthetic biology. It implies taking into account public anxieties, devising early risk management procedures and spending huge efforts at explaining the benefits. When promoting the analogy to nanotechnology, actors suggest that synthetic biology is a defined field of technology with a huge potential for innovative applications while risks can be handled provided it is introduced ‘responsibly’.

**Synthetic biology as DNA-based information technology**: Important streams within synthetic biology entertain a strictly reductionist view on the biological world, implying that the information laid down in the genome
fully determines the properties of the organisms. Thus, synthetic biology is seen as a kind of information technology, only that the information is genetic, steering organisms in a similar way as software steers a computer. Applying engineering principles like in computer sciences, organisms could be made to acquire desired properties. The analogy further implies Moore’s law applying to DNA sequencing and synthesis or similarly hierarchical information architectures of computers and the living world (Adrianantoandro et al., 2006). This analogy suggests that in the future, synthetic biology will become as important as computer science is today. In addition, many synthetic biologists coming from computer sciences bring their disciplinary culture into biology, such as a prevalence for open source (Oye and Wellhausen, 2009). There is also a particular ‘coolness’ factor: idealistic undergraduates in a world-wide competition, hackers in their garages and a science culture opposing the practices and conventions of the scientific establishment (Torgersen and Schmidt, 2013).

The perspective (or framing) applied heavily influences the track the debate will follow: synthetic biology as genetic engineering fosters the expectation of risk and unavoidable controversies. Nanotechnology as the anchor point, in contrast, suggests innovations in the context of possible yet non-existing controversies. The analogy to information technology, among other issues, brings a particular engineer-it-all attitude and a coolness factor to the fore. Choosing an analogy, and thereby stimulating a debate under one of the three respective framings, so the argument, almost inevitably entails choosing a particular perspective and thereby setting the direction. Once set in motion, debates will follow a trajectory mostly determined by the initial choice of the dominant analogy.

As soon as TA engages in organising and determining project-shaped participation processes, therefore, it gets actively involved in the process of constructing the issue through applying, by analogy, problem framings from prior debates. This is not without tensions: a classical tenet of TA is that it should organise inclusive public participation and neutrally moderate a debate, being open to every argument without influencing the direction of the opinion formation. Although actively framing an issue appears contradictory to such an idea, it seems unavoidable: any public debate needs to refer to a certain frame in order to give the issue at stake a shape and to enable participants to discuss it – without a reference, issues like synthetic biology (as thing-in-themselves) could not be debated. Hence, promoting a dialogue necessarily entails such a constructive role in the interpretation of emerging technologies; otherwise there would not be a subject to be debated. This has consequences not only for the outcome of the debate but also for any further tasks assigned to TA. After all, any further activity requested from TA (and eventually, any governance measure) would be a
direct result of the problems and questions that emerge from discussing the technology in a particular way. However, under one frame other problems may emerge than under another frame.

For technologies that lack visible products or practically relevant procedures, TA therefore has an entirely different but at least similarly active function, namely to determine the frame of reference for a debate. Hence, when saying that TA takes on an active role, this can mean (at least) three things: in the case of CTA it means conveying concrete societal interests directly into technology development. In the case of participatory TA it means involving people in the assessment that so far had had no say. In the case of upstream assessment of emerging technologies it means introducing frames to render an abstract issue debatable at all, even if this - more or less unintentionally - introduces a normative taint. In the end, the latter may prove to be most influential as it sets the scene for everything to come.

**Beyond interpretation: from assessment to drama?**

We have seen that today, TA no longer is a silent observer of technology development only to come up with some good advice for policy *ex post*. Rather, it deliberately and actively acquires an active role. To put it in an analogy: TA exchanges the role of a linesman, who had neutrally observed the play from outside so far, for that of an active player or even, if the play gets a bit tired, to that of a playmaker. This said, such an active role could be exercised on different levels. CTA aims at influencing technology, or even product, development, which presupposes that there is a technology able to give rise to products. In the case of emerging technologies, this is usually not the case, so the ‘active role’ is a different one, namely to set the frame of reference in a participatory event in order to render the issue debateable. However, there is a problem already addressed in chapter 3 that looms behind: what if those invited to participate refuse to play ball?

Then TA acquires the role of, so to say, an agency for the problematization of technology. To fulfil such a task as effectively as possible, the issues and problems to be addressed need to be presented in a form that provokes resonance; in other words, in a way that stimulates a debate. Thus, what is needed is a certain dramatization: only issues that get presented drastically elicit attention; only popular promises of benefits or personally touching concerns find their public in the media. Frans Brom, the director of the Department for Technology Assessment of the Dutch Rathenau Instituut reflects on this problem in the following words:

“The results of a TA-project are of interest for the media only if there is something at stake. For getting attention a perspective needs to be
formulated which can be disputed. In order to stimulate social debate and formation of political judgements, we need to evoke objections and at the same time remain scientifically and socially reliable”. (Brom, 2009: 1)

This statement formulates the basic problem of TA. If, as is the case with new and emerging technologies, few are interested in participation and dialogue, then the TA organizers not only have to (soberly) interpret the technology by providing a frame but to effectively mobilize. To stimulate a public debate, TA must raise public attention. Operating according to the rationale of the media becomes a must, which suggests that TA should dramatize the issue at stake using utopian imaginaries and exaggerated expectations (positive or negative). It needs to support the hype, or at least, it must not de-construct it as soon as it emerges. Hence, in the light of project-shaped participation and the interpretative turn, TA might be forced to deliberately evoke dramatization effects.

At the same time, however, the long-standing aim of (classical) TA has not become obsolete. To provide a scientifically sound basis for technology policy and to contribute to a rationalization of the discourse over technology still is a goal worth pursuing. In the case of emerging technologies, rationalising the discourse necessarily implies disarming dramatization effects by way of analytic assessments. To foster public engagement without uncritically echoing or promoting the hype – this constitutes a central challenge for the TA of emerging technologies.

To sum up, technology policy and its accompanying debate sometimes seem to travel on parallel tracks. On the one hand, techno-scientific developments are often said to leave the societal debate behind them. In times of a general fatigue in participation, therefore, we would need the engagement of the largest possible number of concerned citizens to tackle the consequences of novel technological developments. On the other hand, it becomes obvious that vociferously presented but unrealistic promises and similarly proclaimed but unfounded concerns touted in a public debate (that got stimulated on the basis of exactly those claims) leave behind any realistic technological possibilities.

The requirements appear incompatible. Does the TA of emerging technologies steer towards a collision between assessment and drama, maybe even without being aware of it? Or does both belong to the daily business of TA but get processed in different departments of the ‘TA company’? It seems about time to critically reflect on the different and antagonising requirements TA meets in times of emerging technologies and the interpretative turn.
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