

TA as an Institutionalized Practice

Recent National Developments and Challenges

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All articles are revised by the editors of the issue Leonhard Hennen and Linda Nierling, and the editor of the journal Constanze Scherz, ITAS. The articles were first published in "Technology Assessment – Theory and Practice", issue 1(2015), Karlsruhe, Germany; <http://www.tatup-journal.de/english/index.php>

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Foreword

by Lars Klüver, director at the Danish Board of Technology Foundation and coordinator of PACITA

That Technology Assessment (TA) needs to be implemented in a fashion that fits the historical, cultural and political situation in a country has been a mantra in all analysis and debate about institutionalization of TA since European countries began to take up the idea after the first step taken by the US.

Still being useful, it is a mantra that probably needs to be adjusted. The articles in this special issue on the one hand show clearly that establishing TA in a country involves consideration and engagement of the existing structures – which in itself will include a certain element of tradition and, let me also say, conservatism. But on the other hand, the PACITA project has also revealed a tendency of a move towards a more universal approach to TA.

Old TA units seem to some extent to be drawn towards a common center of practice and new units under construction certainly are considering a wider concept of TA than was the case when the older units were made. To me it seems a natural development and it probably has to do with the intense networking and mutual learning processes that have been carried by EPTA (the European Parliamentary Technology Assessment network), by common staff training and exchange of experience in TA, and in the recent years, importantly, by PACITA.

The impression I get after four years of close collaboration in PACITA about expanding TA in Europe is that TA moves towards a more networked institutional self-understanding. This has implications in many ways. The sense of need of closer European collaboration and mutual support seems now much stronger than it was just five years ago – national is not enough anymore. The new EU member state members of PACITA see TA to have a linking role in a terrain of policy-actors in which the Parliament is seen as one (albeit an important one) – and that triggers reflection among the old TA members because they begin to see a comparable trend of fostering the links of parliamentary TA to other actors in their own practice. And, these tendencies can be seen in the uptake of a methodology with more inclusive and interactive work modes – beyond desktop research.

In the longer term this development is promising for European TA, since it means that new and old TA units probably will have more and more in common and will be able to see a widening field open for mutual exploration and collaboration. Europe needs that and the single countries need that. Let us then hope that there will be openness among the many and important stakeholders of TA to support TA in its logic and needed turn towards a shared role and function.

I will thank ITAS for making this focused issue and thank all the authors for their contributions to new and important insights into the state and future of TA.

Taking Stock of TA in Europe and Abroad

Introduction to the Thematic Focus

by Leonhard Hennen and Linda Nierling, ITAS Karlsruhe

The idea of analysing a societal problem in the most comprehensive way, i.e. taking into account all the relevant scientific and societal perspectives in order to allow for rational decision making for the common good, may well be said to be as old as the idea of modern democracy. Legitimate policy making, understood in a liberal sense, is rooted as much in the notion of the people being the sovereign and political institutions representing them as it is in the concept of “reason” represented by “objective” scientific knowledge (Ezrahi 1990). It is difficult to say precisely when this idea developed into a concept, namely of systematically analysing the impact and effects of modern technology in an unbiased and comprehensive way to provide decision makers with a reliable and inter-subjectively acceptable source of knowledge. A demand for and supply of scientific expertise on the uncertain and probably detrimental effects of technology can be traced back to early industrialization (see e.g. Radkau 1989). The date when this concept was baptized “technology assessment” and it was suggested that it be “institutionalized” in the political sense of being embedded in a non-temporary organizational entity with a definite role in political decision making can be given as 1967, when US congressman Emilio Q. Daddario in a report to the US congress pled for “strengthening the role of the congress in making judgements among alternatives for putting science to work for human benefit” (quotation according to Vig/Paschen 2000a, p. 3). In the same year, the same congressman introduced a bill stipulating the establishment of suitable procedures in the congress, which led in 1972 to the decision to establish the Office of Technology Assessment as a congressional agency, which has become the role model for many subsequent parliamentary TA units.

Ideas and concepts are entities of elusive character, “mind games” that in order to become “operable” have to materialize into rules and practices, which again can be cast into some form of organizational structure that provides for continuity and interaction with (or functionality for) other practices. In the case of TA, the institutional form has to provide for links to science, society and foremost politics as TA is intended not only to provide insights but mainly to use these to inform decision making. The concept of TA is open to being taken up by academia, civil society organisations or industry. For democratic reasons, the legislature has always been at the centre of TA’s ambitions since it constitutes an interface between the public and the government and is the place for public

deliberation of public problems. As the process and the result of institutionalization in Western Europe have shown, however, a wide variety of modes of parliamentary TA are possible, and the mission is not necessary only to inform parliament but especially in many European TA institutes to inform and stimulate public discourse. And looking beyond parliamentary TA, if TA can be regarded as a “democratic innovation involving parliaments, scientists and the public sphere” (Böhle/Moniz this issue), the possible forms of institutionalization can be manifold depending on a broad set of boundary conditions.

It has been the aim of the current EU-funded project “Parliaments and Civil Society in Technology Assessment” (PACITA)¹ to explore the opportunity structures for and barriers to strengthening the TA concept in the national political contexts of seven European countries where TA infrastructures are not yet in place, be it for national parliaments, or elsewhere in policy making and society. The overall PACITA objective is to empower European member states and associated countries with an interest in TA to make informed decisions about institutionalizing, organising and performing parliamentary TA. At the same time, PACITA is meant to stimulate reflection in regions and countries with established TA organizations (<http://www.pacitaproject.eu>). The insights, reflections and debates initiated by PACITA about a possible “next wave” of TA (Hennen/Nierling 2014) are in a way the starting point for the present selection of articles about the institutionalization of TA in this thematic focus of this issue of *TATuP*, which also serves to enrich the PACITA debates on institutionalization.

We present this selection of articles on the following topics that we consider relevant for further understanding the process of TA institutionalization, namely the history of TA institutionalization, the different forms of TA in the current landscape (TA units and forms of distributed governance), the risk of the de-institutionalization of TA that reflects the political side of TA, and the national and international scope of TA. Questions that are addressed in the present issue of *TATuP* are thus: What are the implications of institutional models and what are contextual prerequisites (societal, political, economic and cultural) for TA to flourish, and might they be different in different national, international or historical contexts?

A Short History of the “Institutionalization of TA”

Technology assessment as a means of providing policy advice on matters of S&T policy making has been introduced in many Western industrialized countries starting from the late 1960s. Having its scientific origins in systems analysis, planning and forecasting, the field of TA has continued to develop both with regard to conceptual approaches and to research methods. A central and persistent feature that is connected

to its founding idea is its orientation on practical problems of policy making (Decker/Ladikas 2004). In particular, national parliaments have always been regarded as the main addressee and client of TA. From its beginnings at the U.S. Congress in the 1970s, TA has always been tied to two impulses that have driven its development (Guston/Bimber 2000): One drives towards expert analysis, while the other drives towards public deliberation. Accordingly, two models of TA have been pursued throughout the history of TA: a policy analysis model and a public deliberation model. The policy analysis model was predominant when the Office of Technology Assessment (OTA) was established at the U.S. Congress in 1972. Congress intended to provide a broad base of knowledge for its own deliberations and decisions by creating an institution that should be able to inform legislators on any new developments in S&T and should function as an “early warning” facility with regard to possible problems and needs for political intervention.² The policy deliberation impulse was highly important for the foundation of a series of TA institutes associated with national parliaments in Europe in the 1980s and 1990s. This “second wave of TA” (Rip 2012) has consequently been connected with a focus of TA on the involvement of stakeholders and the wider public in TA processes. Parliamentary TA in Europe took up the heritage of the OTA but differs from it in many respects, both organisationally and with regard to methodologies and mission (Vig/Paschen 2000b; Hennen/Ladikas 2009; Enzing et al. 2012; Ganzevles/van Est 2012; Hennen/Nierling 2014).

The situation regarding the political institutionalization of TA is nowadays characterized mainly by the European Parliamentary Technology Assessment Network (EPTA), which comprises 13 national parliamentary TA institutions including the TA body of the European Parliament with another three associate members with a close relationship to their national parliaments (<http://www.eptanetwork.org>). In addition there are many other active organisations or units at universities or other public research institutions and authorities as well as private think tanks that offer their advice to governmental bodies as well as to private enterprises and to civil society organisations from the local to the international level. No overview is available of the TA landscape in this respect. The manifold contributions by TA practitioners with all kinds of backgrounds to TATuP and the documented individual and institutional membership in the German-speaking TA Network may serve as a proxy (<http://www.openta.net/netzwerk-ta>). For the US, the article by Sadowski/Guston in this issue provides at least a sketch.

With regard to the political and national (or international) levels of government, there still are big white spots in the TA map. Especially for Europe – given the existing European R&D policies and its ambition to establish a “European Research Area” – the expansion of the TA landscape to many Southern, Eastern and Central European countries can be considered a challenge.

In these countries, the idea and concept of TA (not to speak of institutional bodies) is either widely unknown (see *Leichteris* in this issue) or – despite an often longer history of debates among political and scientific advocates – has not succeeded yet in gathering enough support from influential actors to materialize into some form of institution (see *Böhle/Moniz* for Portugal and Spain, or *Delvenne et al.* for Belgium/Wallonia in this issue).

Forms of Institutionalization

In the existing literature on TA institutions, the focus on parliament is usually very strong. Historical, political and cultural reasons are used to trace the path and the specific mission with which a TA institution was set up for a parliament (Vig/Paschen 2000b; Enzing et al. 2012; Delvenne 2011). This often highlights the diversity of different TA models, practices and effects. Three primary institutionalization models of TA have become very popular for describing European TA institutions: the parliamentary committee model, having a parliamentary committee leading a parliamentary technology assessment unit; the parliamentary office model, describing a specific office to accomplish TA studies at the request of parliament; and the independent institute model, where a TA institute operates outside parliament but with parliament as main client (e.g. Hennen/Ladikas 2009; Enzing et al. 2012).

In this issue, the state of discussion of different institutional models of TA is taken a step further. Without a doubt, parliament was the first and most important addressee of TA. In times where science and technology issues form prominent items on political agendas, a range of parliaments in Europe followed the US example and initiated an institution providing parliament a better capacity to control the government’s decisions in S&T policy making. In its institutional practices, however, the scope and reach of TA today goes beyond this connection to parliament. Currently, there are a number of institutionalized forms of TA in Europe – be it connected to the parliament, to the government or to the scientific system. The contribution by *van Est, Ganzevles* and *Nentwich* thus argues in favour of opening the strong parliamentary perspective of TA also and equally to other important actors, namely the government, the science system and society. Based on empirical research into the current practices of TA institutions in Europe, they develop a modelling approach giving TA institutions a function of mediating science and technology issues across four spheres: parliament, society, government, and science. The diversity of national models which is outlined in their contribution shows the social and political specifics of a TA institution and – especially for new TA players – the necessity of finding one’s own place and model of institutionalization (see also the articles by *Böhle/Moniz*, *Delvenne et al.* and *Leichteris*). It also intends to offer a continuous tool for existing institutions to let them determine their own place – and maybe also any necessary strategic shift – in relation to their European counterparts.

Having one institute specifically dedicated to TA is the most obvious form of an institutionalization of TA. Interestingly, two articles in this volume provide more flexible understandings of institutionalization. The contribution by *Sadowski/Guston* describes a distributed model of institutionalization for the current US context. Here, TA competence and functions are scattered across a range of institutions from all the four of the spheres identified above. The article shows that although OTA – as the “mother institution” of TA and still an important point of reference for European discussions – ceased to exist long ago, the US can offer a way that either can be developed into a new institutional mode or at least may serve as a good starting point for future initiatives for parliamentary TA. Even without a fixed TA institution, TA as such seems in the meanwhile to be deeply anchored in society and some of its institutions, so that a distributed model of TA can be described for the current US landscape.

Another “flexible” institutional model is proposed by *Leichteris* in his contribution on the state of the art of TA in Central and Eastern Europe. He proposes a network model of institutionalization for these countries with no tradition of “thinking in TA terms”, a lack of trained personnel and merely an “unrecognized need” for TA by political and societal actors. This (rather transitional) institutional model serves to unite the existing “forces” for the way ahead.

The Other Side of the Coin: De-Institutionalization of TA

The process of setting up a central body of technology assessment with the function of providing independent advice to the national policy-making level is often – as is proven by the history of many parliamentary TA units (see contributions in Ganzevles/van Est 2012; Vig/Paschen 2000b) – a long and winding road of initiatives, a search for TA advocates in the academic and political system, a search for supportive coalitions across existing political factions, a constant argument against hostile positions from relevant players in the innovation system and a defence against accusations of allegedly following a hidden agenda of “technology arrestment” and the like. This corresponds to the experience of many practitioners and supporters of parliamentary TA bodies that it is part of their daily business (even after years of established successful practice) to prove the usefulness and functionality of scientifically sound, non-partisan political advice under conditions of quickly changing political agendas and changing political personnel, resulting in changing expectations and interests of its client. In the case of the parliament, the fact that “the client” is made up of several groups often representing opposing interests remains the source of a constant challenge. It is thus not surprising that the OTA, the first case of a successful long-term institutionalization of the TA concept, not only has been a role

model for many subsequent institutionalizations but also provides the first case of “de-institutionalization”.

The recent history of parliamentary TA in Europe has seen the discontinuation of the Institute Society and Technology (IST) at the regional parliament of Flanders and the “rededication” of the Danish Board of Technology from a publicly funded body advising the Danish Parliament to a non-profit private foundation. It is of course impossible to come up with a universal explanation of the central causes of de-institutionalization. The little that is available in terms of analytical reasoning points, however, at a few critical factors. One obviously is holding, or failing to hold, the balance between opposing expectations of influential political factions. The fact that the OTA was always regarded with suspicion by the republicans as a “tool of the democrats” is regarded by many as at least a decisive factor that led to the closure of the OTA as soon as the republicans won the majority in both chambers of the US congress. And *Sadowski* and *Guston* (this issue) hold that the current “aggressive partisan divide” in the congress is not at all conducive to any new initiative to re-establish a non-partisan and scientifically independent body of policy advice. Being non-partisan and independent in the sense of not serving specific interests bears the risk of not making it into the news and having a low public profile. Reflecting on the reasons of the closure of the Flemish IST, its former director says in an interview: “... independence also means that nobody will defend you when you are in trouble” (Rabesandratana 2013). The lack of public profile and thus support (as a consequence of its formal ties to parliament) has also been addressed as a cause of the political “down grading” of the Danish Board of Technology (Horst 2014; see also *Delvenne et al.* this issue).

Another risk factor is most probably TA’s hybrid character as a concept between science and policy making. In the case of IST, one decisive argument purported in parliamentary debates was that parliament is not there to fund research. In the words of IST’s former director: “... there was a perception that research is nothing parliament should pay for, that what we did was somehow already done by researchers elsewhere” (Rabesandratana 2013). In the case of DBT, the argument of the ministry for cutting DBT’s budget to zero was the need for reallocation of budgets for strategic research and that the DBT (although funded from the research ministry for decades) could not be regarded as doing research. Being neutral and independent and at the same time publicly visible, serving the needs of policy makers and at the same time having one foot in academia, taking a leading role in public S&T debates without taking a definite position in them are challenges ingrained in the concept of TA as an “honest knowledge broker” (Pielke 2007). This demands a lot of “balancing activities” which involve vulnerability – the more so when “hostile environments” search for “good reasons” for discontinuation.

“TA has Politics”

“Hostile environments” are often suspicious of a hidden anti-technocratic agenda held by TA. TA stands for a specific open, transparent, democratic, inclusive and “socially robust” mode of S&T policy making. The establishment of TA, as *Delvenne et al.* argue in this issue, is not only conducive to non-technocratic modes of R&D but is itself, as a concept, also tied to pushing the democratisation of S&T governance, thus not just taking a neutral position in R&D policy making. For Flanders and Wallonia, *Delvenne et al.* show that TA initiatives flourished in an era of a policy shift to “strategic science”, i.e. a shift from isolated academic research to research that is socio-economically relevant. It was in this context of active R&D governance that initiatives of further opening the process of knowledge production and R&D decision making to a broad range of stakeholders successfully introduced TA into R&D governance debates. *Delvenne et al.* argue that “TA has politics” as it is aligned with a deliberative, open, democratic style of S&T governance and has often been primarily fostered and thus “naturally” promoted by policy makers with a left or green background. They argue that TA – in the course of being adopted as a neutral knowledge broker serving the needs of all fractions of parliament – loses its teeth, i.e. is no longer supportive of the goals associated with it by its advocates. This is a challenging argument that contradicts the discourse legitimizing TA that is usually heard in institutionalization debates – not surprisingly since institutionalization ideally needs the support of all sides, which is especially true in a parliamentary context with changing majorities. Does the institutionalization of TA as a central body providing policy advice on the national level (e.g. parliament) necessarily come at the price of being “tamed”? Our guess is that this question is by no means unfamiliar to TA practitioners involved in advising parliament, but the question may deserve to be dealt with more thoroughly and openly when reflecting on the opportunities, modes and risks of institutionalization.

National “TA Habitats”

We concluded from our research during the PACITA project on the conditions conducive for TA to evolve in countries where this has not yet been the case that the qualitative concept of what we called a “TA habitat” is important when thinking about introducing TA in a specific country (Hennen/Nierling 2014). The specific societal features of such a TA habitat provide room for further research but, drawn from the historical development of today’s TA institutions, it seems that the process of institutionalization is highly dependent on a specific political context and the presence of political entrepreneurs pushing the idea of TA. The climate supportive of TA institutions thus seems to involve an interest by parliament, a scientific community trained and interested in interdisciplinary problem-oriented research, and a civil society eager to

discuss and to raise their voice in issues of science and technology policy making. The country case studies discussed in this special issue also provide evidence of such features of national TA habitats. In some cases the authors of the articles even play a double role: a scientifically trained observer of institutional landscapes on the one hand, and a national political entrepreneur of TA on the other.

The contributions by *Böhle/Moniz* and *Delvenne et al.* both describe the long political negotiation processes which stand behind recent attempts and failings to institutionalize TA at either national or regional parliaments in Europe, where the smart use of “windows of opportunity” plays as important a role as the constant efforts of political and scientific actors to keep the idea of TA alive on the rapidly changing political agendas. They differ, however, when they analyse the specific function that TA has in the political environment. *Böhle/Moniz* still argue for the neutral function of TA as a means to “increase accountability and responsiveness of the political system regarding its innovation and environmental policies”, which from their point of view can even serve as a first response to concerns citizens have expressed in Southern Europe. *Delvenne et al.* argue in contrast that the main motivation for an institutionalization of TA is deeply intertwined with the interest-driven push of regional science, technology and innovation (STI) regimes to be the dominant climate characterising the Belgian TA habitat.

The contributions by *Leichteris* and *Sadowski/Guston* both are sceptical – although for very different reasons – of the sensibility of the long-held role of parliament as the best location for a national TA institution. The Lithuanian case stands for the difficulties which occurred in a recent exploratory process to ground modern forms of science-based policy making in Central and Eastern Europe where the centralist heritage of the Soviet Union is still prevalent. *Leichteris* concludes that the political climate is not yet ready for TA as far as politicians as well as governmental and science organizations are concerned. He thus proposes a transitional strategy of lobbying for and marketing of TA. The US case describes in contrast a habitat still supportive of TA where TA has until now been taken for granted. The supportive nature of this habitat is grounded in a range of organizations in the field of government, civil society and science even though it lost its prominent role in congress. The extent to which TA will be carried on in this distributed manner in the US in the future remains to be seen.

Both case studies furthermore allow us to shed a bit of light on the concept of “distributed TA” (*Sadowski/Guston*) – a term principally characterizing a lack or a flaw as it implies that TA is only a niche business. Can it also be understood as a strength when TA is distributed at decisive points in the R&I process – one could think of integrated or constructive TA early on in the R&I process? At least for specific national contexts, such a mode of institutionalization

can be regarded as a prerequisite or a necessary step towards building more politically influential structures. In the case of Central and Eastern Europe (*Leichteris*) as well as in the context of international development (*Ely et al.*), the network model can be regarded as a step forward.

Future Outlook: TA on an International Level

How can we think of the future of institutionalization? Following the previously successful attempts of Western European institutions, can we still think of fixed pathways? The experiences of de-institutionalization (Denmark, Flanders, US) as well as the forward looking contributions in this special issue show that there are still followers of the “traditional Western model of TA” (see *van Est et al.*, *Böhle/Moniz* and *Delvenne et al.*) on the one hand, but also a range of modified pathways towards the future (*Leichteris* and *Sadowski/Guston*) on the other. It becomes obvious that the concept of TA as well as its forms of institutionalization need to be flexible and open to adapt to different political and social surroundings while still reflecting its specific heritage.

Although TA as a means of providing policy advice has *per se* a strong focus on the national context, it does not appear to be reasonable or even possible anymore to limit TA to national borders. Not least the European Union – an important actor for funding research as well as for cross-border exchange and learning – has also triggered institutionalization processes in certain countries, as with the PACITA project, which can be understood as a recent “re-energizer” of TA institutionalization (see *van Est et al.*). Without doubt, the role of the EU is a difficult one here: funding projects for a limited time span leaves the cooperation and the processes started in an open status, where stabilization and continuity would be preferable. The contribution by *Peissl/Barland* addresses the challenges that such a European perspective poses to TA. Thinking in a “Cross-European TA” perspective about TA pits benefits against its drawbacks: great opportunities for collaboration and mutual learning as well as a stronger position of the TA community through networks like EPTA versus a lack of structural funding from the EU; thus a strong dependence on the national context while at the same time facing the difficulties of European cooperation when attempting to transfer national results. Notwithstanding these difficulties, the European or even international perspective on TA will gain even more weight in the future.

The contribution by *Ely et al.* opens such a truly international perspective by presenting how TA can be employed by non-governmental organisations in developing countries. The idea which this perspective strengthens is the “broadening out and opening up” not only of the concept of TA but also of the actors and institutions involved in TA to international organizations, such as the UN or OECD but also to globally operating NGOs. What we can learn

from the international exercise *Ely et al.* present is the need for TA to stay flexible and open in order for it to be fruitfully employed in various contexts, but also the need to be clear about the limits and frame of the TA concept and of the institutions which can be named TA institutions.

Notes

- 1) PACITA (FP7, 2011-2015) is a four-year research and action plan, funded by the European Commission Framework Program 7, under Theme SiS-2010-1.0.1 Mobilisation and Mutual Learning Actions.
- 2) For a history of OTA and an analysis of the reasons for its closure in 1996 after a major change from a democratic to a republican majority in congress, see *Herdman/Jensen* 1997; *Hill* 1997.

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Modeling Parliamentary Technology Assessment in Relational Terms

Mediating Between the Spheres of Parliament, Government, Science and Technology, and Society

by Rinie van Est, Rathenau Instituut, The Hague, Jurgen Ganzevles, Radboud University Nijmegen, and Michael Nentwich, ITA Vienna

This article describes parliamentary technology assessment (PTA) in relational terms.¹ We conceptualize PTA as fulfilling a mediating function between the spheres of parliament, government, science and technology, and society. This mediation is thought to take place through a set of interaction mechanisms on the institutional, organizational and/or project level that enable and constrain the involvement of actors from the above-mentioned four social spheres in shaping the practice of PTA. This enables us to model, map, and analyze how PTA in various European countries and regions is set up to interact with members of parliament, government, science and technology, and society. We found that the possible relationships between the PTA organization and each of the four social spheres have to be analyzed and carefully designed when thinking about setting up PTA. Countries with an interest in setting up PTA are not restricted to existing institutional models, but may create a model that is particularly suited to their own political and societal environment.

Introduction

Parliamentary technology assessment (PTA) is “technology assessment specially aimed at informing and contributing to opinion formation of the members of parliament as clients of the TA activity” (Enzing et al. 2011, p. i). Institutionalization, methodology and impact have been major themes in the debates around PTA ever since PTA was envisioned in the US during the 1960s (Vig/Paschen 1999; see Sadowski/Guston in this volume). Over the last few years, in particular the EU-funded PACITA project has re-energized the debate on the institutionalization, re- and de-institutionalization PTA.²

PTA practitioners within the PACITA project felt the need to develop a more inclusive way of modeling PTA since the ways the literature characterizes PTA focus too strongly on the relationship between the PTA organization and the parliament (cf. Ganzevles et al. 2014). The inclusive modeling³ presented in this article does *not* take interaction with the parliament *a priori* as the main determinant of a PTA organization. PTA is modeled more broadly as a mediating function between the spheres of parliament, government, science and technology, and society.⁴ We suggest that this mediation takes place through a set of interaction mechanisms that include institutional, organizational and project dimensions. This inclusive modeling fits well with the existing pluralistic PTA landscape. It also helps to deconstruct in a more transparent way these diverse practices by laying bare the many political, strategic, and practical choices involved in institutionalizing, organizing, and performing PTA.

In the PACITA project, conceptualizing and studying PTA were organized in an iterative manner. First an initial conceptualization of PTA was made. Moreover, an initial set of interaction mechanisms, which forms the basis how we model PTA, was identified. Based on this, a checklist was set up to guide the in-depth description and analysis of several existing practices of PTA in Europe. In particular, PTA was investigated in Austria, Catalonia (Spain), Denmark⁵, Flanders⁶ (Belgium), Germany, the Netherlands, Norway, and Switzerland. These case studies were used to refine our conceptualization of PTA and complete the set of interaction mechanisms. Finally, TA practitioners working at a certain PTA institute and researchers from a European country without a PTA institute were asked to use this information to model the various PTA practices studied in the PACITA project. At our request, the PTA organizations in France, the UK, the European Parliament, and Finland have also characterized their institutes in order to extend the comparative analysis. Accordingly, we have included twelve PTA institutes in our comparative analysis, of which all, except for Flanders, are current members of the European Parliamentary Technology Assessment (EPTA) network. Greece, Italy, and Sweden are the only members of the EPTA network not included. Our analysis therefore gave a rather complete picture of the institutional PTA landscape in Europe.

This paper describes how PTA was conceptualized within the PACITA project (section 2), how the inclusive modeling of PTA, based on the identification of nine interaction mechanisms, looks (section 3), and how this model can be applied to existing PTA organizations (section 4). At the end of this paper we draw some conclusions and discuss further interesting lines of research.

Conceptualizing Parliamentary TA in Relational Terms

“In explaining what an expert is, one can either refer to the particular knowledge people have, or to the position they occupy in a social network.” van Rijswoud 2012, p. 18

In clarifying what PTA is, one may describe its institutional position in both informational and relational terms. According to the informational perspective, the position of the PTA community depends on the particular knowledge it generates, i.e., knowledge about the societal aspects of science and technology. According to the relational approach, its position is due to the existence of a clientele. In practice, the informational and relational aspects go hand in glove since the exchange of information needs to be organized and seen as legitimate. Accordingly, PTA in the PACITA project is framed as a science-based practice of information production on science, technology, and social matters. Moreover, PTA is also regarded as a social activity where practitioners try to have an impact on their clients by building up relations of knowledge sharing and trust among actors from various societal spheres. Understanding PTA in relational terms implies taking into account the position PTA occupies in a social network and acknowledging that the various bonds enable and constrain the activities and impact of a PTA organization.

Connecting to Four Social Spheres

Most of the literature characterizing PTA (cf. Falkner et al. 1994; Hennen/Ladikas 2009; Cruz-Castro/Sanz-Menéndez 2005; Enzing et al. 2011) has focused on the question of to what extent each PTA organization has been put within or outside parliament (Ganzevles et al. 2014). By definition, parliament is an important player within the social network of PTA organizations. PTA organizations are democratically entrusted to build connections with MPs or even directly access and inform them. We felt the need to abandon the view that one single logic – the relationship to parliament – is shaping PTA. Our modeling efforts build, in contrast, on the common knowledge that PTA institutes are shaped by more institutional linkages. For example, it is known that PTA plays an intermediary role between the parliament and the science and technology sphere. Moreover, a PTA organization can also have the institutional task to both inform the political and the societal

debate, implying that developing bonds with societal actors may be relevant for PTA institutes. Finally, in the European political context, governments often also play an important role in the social network of PTA organizations, for example, as a client or a sponsor of a PTA organization. Thus, we modeled PTA to operate in a complex institutional landscape that consists of four social spheres: parliament, government, society, and science and technology.

Three Levels of Interaction

PTA practitioners like to frame their practice in both informational and relational terms (see above), as they broadly define TA as “a scientific, interactive and communicative process, which aims to contribute to the formation of public and political opinion on societal aspects of science and technology” (Bütschi et al. 2004, p. 14). This definition, however, basically refers to the practice of performing PTA. We would like to go beyond this definition and study the linkages between PTA and the four distinguished social spheres on three (interconnected) levels: the institutional, organizational, and project levels.

The macro, or institutional, level, concerns the political support for a TA organization for which parliament is (one of its) main (formal) clients; it is also about the way PTA is legitimized and framed as an institutional solution for the governance of – often societally controversial – developments in science and technology. The meso, or organizational, level concerns the politics of shaping and controlling the TA organization that has the task to perform PTA. Finally, the micro, or project, level refers to doing PTA. Issues at this level are: how to frame a certain topic, what kinds of methods to choose, and how to communicate the results of your TA project to parliament and to other relevant clients. The ultimate aim is to contribute to the democratic quality of the (public and political) debate on science and technology. As indicated above, these levels are interrelated.

The way in which PTA is institutionalized enables the related TA organization to have an impact. Enabling may refer to being provided with the proper resources and the institutional task to participate in the political decision-making process and thus to influence the democratic process. Simultaneously, that same institutional context will constrain the way in which that TA organization may perform its activities. As Cruz-Castro and Sanz-Menéndez (2005, p. 446) provocatively conclude: “Some of the best adaptation strategies that Parliamentary Offices of Technology Assessment use to improve their chances of survival clash structurally with the desire to increase the direct impact of their TA activities on policy-making activities.” For example, while building coalitions and aligning with the political majority in Parliament may be a quick way to enhance impact, in the long term “a new majority can make one pay for institutional disloyalties”. The way in which a PTA organization is institutionalized thus both

enables and constrains how a PTA institute can operate within the complex landscape that consists of the four social spheres identified above.

Modeling PTA by Means of Nine Interaction Mechanisms

Our modeling of PTA in relational terms is founded on the notion of interaction mechanisms, loosely defined as procedures or routines on the institutional, organizational, and project level for enabling and constraining the involvement of actors from the above-mentioned four social spheres in shaping the practice of PTA. We discern nine interaction mechanisms: client, funding, evaluation committee, board, working program, project staff, project team, participatory methods, and project revising and/or reviewing. We use the various countries and regions studied in the PACITA project to illustrate how these nine mechanisms play out in different ways in the practice of PTA in Europe.

The *client* of an organization has a major impact on how PTA is set up and how its work processes are structured. PTA organizations in France (OPECST) and Germany (TAB) and on the European level (STOA) focus on parliament. The PTA organization in Catalonia works for parliament and society. Until it was abolished in 2012, the former PTA organization in Flanders, IST, also had both the parliament and society as clients.⁷ We see a combination of parliament, government, and society as clients in Denmark, the Netherlands, Norway, and Switzerland. In Austria the science community is an explicit client.

Funding may involve long-term basic funding schemes, but also short-term sponsorships on a project level. Exclusive parliamentary funding exists, for instance, for the European Parliament (STOA) and in France (OPECST), Germany (TAB), and the United Kingdom (POST). In Catalonia (CAPCIT) there is sponsorship from the science and technology community. In Austria (ITA), the Netherlands (Rathenau Institute) and Switzerland (TA-SWISS), the funding scheme is related to both the governmental and the scientific spheres. We encounter a more dispersed funding pattern in Denmark (from 2012) and Flanders (until 2012), where parliament, science, and society are involved.

The *evaluation committee* or *group* refers to the task of examining and reporting on the functioning of the organization as a whole. An evaluation committee may be installed by the government (as happens in the Netherlands every five years and happened in Norway in 2011), by the organization's "own" steering committee or board (as happens in Switzerland), or by an evaluation board set up by the mother institution (like the Austrian Academy of Sciences does for ITA). The Danish Board of Technology has a board of representatives that takes an evaluative stance in annual report meetings. Representatives from different societal spheres are involved in the evaluation procedures of the above organizations.

In the evaluation of PTA organizations working close to parliament (like STOA, IST, and TAB), parliamentarians have a relatively strong say in formal evaluations by the organization. In the UK (POST), Catalonia (CAPCIT), and France (OPECST), no formal evaluation procedures exist.

Most of the organizations have a *board*, *committee*, *panel*, or *platform* that has regular interactions (typically every two or three months) with members of the management team that is in charge of performing daily TA activities. For STOA and TAB this entity consists of parliamentarians only. In France (OPECST), it is the parliamentarians themselves who perform TA, and their staff has an auxiliary function. In Austria (ITA), the board consists solely of representatives of science, and the Steering Committee in Switzerland (TA-SWISS) is also strongly linked to the scientific community. In Flanders (IST) and Catalonia (CAPCIT), the board or panel, respectively, is equally divided between parliamentarians and representatives from the science and technology community. More dispersed patterns of involvement of different spheres exist in other organizations.

Most of the organizations have an annual, bi- or tri-annual *working program*. Establishing such a program is a parliamentary task for the European Parliament, carried out by the STOA panel, which takes into account requests from both parliamentary committees and individual members. In Germany (TAB), this responsibility is shared between politicians and the scientists from the TA office. At other organizations, we see a stronger involvement from society and government. Draft programs are often discussed with people from outside the institute. Catalonia (CAPCIT) does not work on the basis of a working program, but priorities are set periodically at each platform meeting.

The four remaining interaction mechanisms all play out on the project level. We use the word *staff* to refer to the people who are in charge of the TA projects. In principle, these practitioners may have ties to any of the four societal spheres: parliament, government, science, and society. In practice, staff at most of the organizations is mainly based in science. The inclusion of more communication and (project) management skills in the organizations accounts for the involvement of the societal sphere in Denmark, Flanders, the Netherlands, Switzerland, and Norway. Only in France do parliamentarians themselves carry out this task (although with staff support). Since the TA staff may outsource part of the work, the *project team* is another relevant mechanism for involving different social spheres within the project. The same counts for *project participation methods* and mechanisms for *project advising and/or reviewing*. The latter may consist of scientific peers or stakeholders reviewing draft texts. By contrast, in Norway (NBT) heavy involvement of experts and stakeholders throughout the complete project is the normal case.

Applying the Modeling to Existing PTA Organizations

As indicated in the introduction, the PACITA project investigated PTA in depth in Austria, Catalonia, Denmark, Flanders, Germany, the Netherlands, Norway, and Switzerland. For each country or region, the research was done by a mixed team, which consisted of TA practitioners that worked at the PTA institute under scrutiny and researchers from a European country without a PTA institute; these latter researchers worked at organizations that took part in the PACITA consortium.

Each team carried out several semistructured expert interviews with relevant stakeholders, such as MPs and the director of the TA unit. In addition, the teams used institutional archives, websites, and earlier descriptions in the literature of the respective institutions to compile up-to-date descriptions and analyses. The reports on all the countries follow the same set-up, clarifying the institutionalization and organization of PTA in these countries. Furthermore, an in-depth case study of one TA project was included per organization in order to illustrate the ‘nuts and bolts’ of daily practice.

In order to characterize the various PTA organizations from a relational perspective, the teams were asked to fill in a matrix spanned up by the nine interaction mechanisms and the four spheres: parliament, government, science and technology, society. In this way the teams had to indicate to what extent the nine interaction mechanisms enabled and constrained the involvement of actors from the four social spheres. The teams had to express the involvement of the various spheres in shaping the practice of PTA in percentages. For each mechanism, the total involvement of the four spheres should add up to a hundred percent. To determine the overall involvement of each of the spheres, the PACITA task team decided to consider each of the nine interaction mechanisms as equally important. In this way, based on the results of the in-depth qualitative research of the various PTA organizations, a semiquantitative description of those PTA organizations was constructed. This strongly facilitated the comparative analysis of the PTA institutes studied. Moreover, this mixed qualitative and quantitative approach enables us to create a graphical representation of each PTA organization. See Figure 1, in which the width of each arrow represents the strength of the involvement of each sphere.

The graphical representations of the PTA organizations from France, the United Kingdom, the European Parliament and Finland can also be found in Figure 1. These PTA organizations were not part of the PACITA project and were not studied in detail. Nevertheless, these countries were included in the concluding chapter of the report, extending the comparative analysis made there to provide a more complete picture of the PTA landscape in Europe (Ganzevles/van Est 2012). Upon our request, the PTA organizations

in France and the UK and at the European Parliament filled out the same table, also recording their scores (Ganzevles/van Est 2012). In order to increase the objectivity of the process, country/region reports, common tables, scores, and mappings were sent out to all the PACITA partners for feedback. Finland was added later as an extra case (Ganzevles et al. 2014) and was not part of these feedback loops.

In theory, eight different organizational models for PTA⁸ can be distinguished. The mapping process in the PACITA project identified four distinct PTA models that are currently operational in practice: mainly parliamentary involvement, shared parliamentary-science involvement, shared parliamentary-science-society involvement, and shared parliamentary-government-science-society involvement (see Fig. 1).⁹ Besides these four PTA models, the TA model of shared science-government involvement was found in Austria.

Mainly Parliamentary Involvement in TA

PTA in France and Finland and at the European Parliament is dominated by the involvement of parliament in the practice of TA. OPECST shows a near maximum level of involvement by MPs, even on the project level, where members of OPECST are responsible for writing the TA report (Enzing et al. 2011). In Finland, it is mainly scientific experts who contribute to PTA projects. Moreover, the Committee of the Future is in a constant dialogue with the government, although the government has no formal say regarding its working program. The STOA panel of the European Parliament works with procurement procedures that are embedded in a framework contract, for which scientific consortia, experienced in TA, can apply on a project-to-project basis (Delvenne et al. 2011).

Shared Parliamentary-Science Involvement in TA

Like in France, the German Parliament is strongly involved in the practice of TA. There is, however, one crucial difference between the German and French situation: the actual TA research is performed by researchers within TAB – an office that works closely with but is outside parliament – and, to a considerable extent, by outside contractors. The German model for organizing TA presents a form of “shared parliament-science involvement in TA”, in which, however, the parliament has a strong voice and the final say. The Advisory Board of the Parliament of Catalonia for Science and Technology (CAPCIT) is attached to the regional parliament, but as a mixed body: half of its eighteen members are MPs and the other half scientists. Moreover, the scientific community sponsors and performs the TA activities. In the case of POST (UK), a scientific unit is placed directly inside parliament, and works in close contact with MPs.

Shared Parliamentary-Science-Society Involvement in TA

Half of the board of IST (Flanders) consisted of MPs, and the other half of scientists. In addition to parliament, the wider public was a formal client of IST in Flanders. IST put a lot of effort into stimulating public debate, by means of participatory methods, technology festivals, and communication. Typifying PTA in Flanders (until 2012) as a form of “shared parliamentary-science-society in TA” does justice to the fact that IST had strong links with parliament, with science, and with society. Although the foundational structure of the Danish Board of Technology (DBT), as installed in 2012, differs significantly from that of the Flemish situation, the four spheres exert a similar amount of relative influence on it. It has strong ties with the social sphere, in particular via its participatory procedures.

Shared Parliament-Government-Science-Society Involvement in TA

Active MPs do not participate in the boards of PTA organizations in the Netherlands, Norway, and Switzerland. In its role as client, however, parliament exerts an indirect, but crucial, influence on the way the TA organizations in these countries function. In these countries, the government and wider society are also included as formal addressees. Moreover, government plays a role in funding the TA organizations. Accordingly, we refer to this model of organizing TA in the Netherlands, Norway, and Switzerland as “shared parliament-governmental-science-society control”.

Shared Government-Science Involvement in TA

In addition to these four PTA models, another TA model was identified in Austria, namely “shared government-science involvement in TA”. ITA in Austria has very strong ties with science. This involvement is mainly shared with the government (both in Austria and at the EU level), which is one of the clients and the most important sponsor. More recently, parliament has shown increased interest in TA. Via participatory methods, ITA has also strengthened the involvement of society in its projects. A gradual shift towards model 4 can be detected.

Scrutinizing PTA in a New Way

In this article we model PTA in relational terms. The existing literature typically focuses on the formal institutional and organizational relationship to parliament as being the main determinant for classifying a specific PTA organization. In addition to its connections with parliament, the approach as developed within the PACITA project also takes into account interactions between the PTA organization and three other social spheres, namely government,

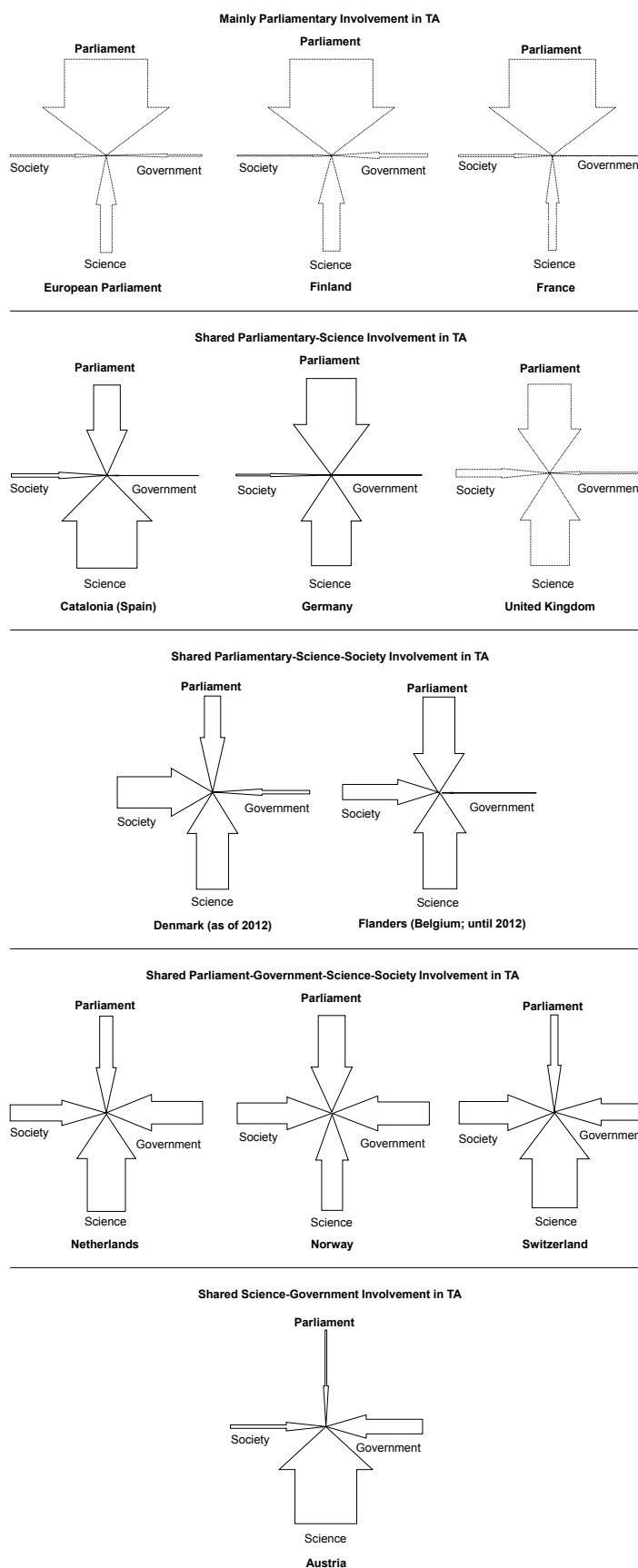
science and technology, and society. Moreover, it makes it possible to study this relationship on three levels (institutional, organizational, project) in an empirically transparent fashion by distinguishing nine interaction mechanisms, which are procedures that enable and/or constrain the ways in which PTA organizations may shape their interactions with the four spheres.

Research within the PACITA project shows that PTA organizations indeed establish and maintain multiple relationships with the four discerned social spheres. PTA organizations differ from each other to the extent to which they interact (on both the institutional, organizational, and project level) with the four distinct social spheres. Out of the eight theoretically conceivable interaction models, four distinct interaction models for PTA are currently operational in Europe. Thus when policy makers and politicians discuss the creation of a new PTA institution or the future of an existing one, they are advised not only to discuss its preferred relationship to parliament, but also with government, science and technology, and society. To make things even more complex, thinking about the interaction between PTA and the four spheres should be done on the institutional, organizational, and project levels.

This may sound like common sense and mirroring the existing practice, but that is surely not the case. As already mentioned, the existing literature mainly focuses on the relationship of the PTA institution with parliament. There is even such a bias within EPTA (the European Parliamentary Technology Assessment network). More specifically, most attention is paid to the institutional and organizational dimensions of this relationship. Except for the country reports of the PACITA project (Ganzevles/van Est 2012), the project level – the practical level that finally decides whether PTA has an impact on parliamentary debate and decision making or not – is rarely touched upon. In contrast, with respect to the relationship between PTA and society, most of the academic work and debates deal with participatory methods, that is, they focus on the project level (cf. Slocum 2003), leaving implicit how such participatory methods should be embedded in organizational and institutional structures. Finally, although there is a lot of literature that deals with the role that scientific advice plays in policy making, reflection on the interaction between PTA and the spheres of science and technology and even more so that of government is almost nonexistent.

In this way, defining PTA in relational terms opens up a new research agenda with respect to the practice of PTA and TA in general. The PACITA project partly addressed this new agenda by using case studies to describe, basically for the first time, how in practice PTA organizations try to connect to the various spheres to achieve an impact (Ganzevles/van Est 2012). Other relevant research questions are: By whom and how is interaction between PTA and the various social spheres debated and shaped

Fig 2 - I. Overview of (parliamentary) TA models found in the PACITA project



(P)TA is illustrated as a mediating function between the spheres of parliament, government, science and technology, and society. The width of each arrow represents the strength of the involvement of each of the four social spheres. For reasons of convenience, “Science” was used as shorthand for “Science and Technology”. The thin lines indicate that these cases have not been studied comprehensively in the PACITA report (Ganzevles/van Est 2012).

Source: Ganzevles et al. 2014

on the various levels? How do the actions on a certain level influence activities on another level? If (participatory) TA methods developed at the national level are used on the European political level, to what extent do they require well-developed relationships between PTA and the political system on an institutional and organizational level?

When we return to the issue of institutionalizing PTA, our modeling of PTA in relational terms can be used to map the institutional development of PTA over time. Appreciating the dynamics of PTA on the institutional level is crucial for the future of PTA, with regards to creating new institutions and maintaining existing institutions or to adapting them to new political demands. The case studies show that a long-term perspective is needed to come to grips with that process. For example, the national political debate about setting up PTA was found to take a long time; often more than a decade. Moreover, existing institutes may radically or gradually change their institutional position. We saw for example that, as the Austrian parliament is knitting closer ties with the TA and foresight communities and participatory procedures are gaining importance in ITA's work, Austria is drifting away from "shared science-government involvement in TA" towards model 4 (shared parliament-government-science-society involvement in TA).

When we take a long term perspective, we see that PTA organizations show institutional flexibility and adaptability. They drift, so to speak, through a so-called "institutional possibility space" that consists of fifteen models. There is even the possibility that they might drift out of that space, as in Flanders where PTA ceased to exist on January 1, 2013. Countries with an interest in PTA or which already have PTA capacity should try to find the model that is particularly suited to their (evolving) context. The "possibility space" that is chosen will provide ample opportunities for adapting to changing political demands (Hennen/Nierling 2014). Both abrupt and gradual changes are possible, and many development scenarios are imaginable. For example, a country may first set up a PTA organization that focuses on its relationship with parliament and later on develop its relationship with society. Or it may first establish a good relationship with government and science and technology, and only later gradually develop a stronger relationship with parliament.

We may conclude that the way we have modeled PTA in relational terms proved useful to describe, characterize, and acknowledge the diverse nature of the various PTA arrangements in Europe. It also clarifies the diverse challenges involved in setting up and maintaining PTA organizations. We hope that defining PTA in relational terms opens up a new manner of understanding and questioning PTA and its role and impact in the way modern society deals with science and technology.

Notes

- 1) This article is based on research done within the EU-FP7 project PACITA (Ganzevles/van Est 2012) and an article which compares our way of modeling parliamentary technology assessment (PTA) with the existing literature (Ganzevles et al. 2014). The present article wants to stress the political relevance of this approach, as formulated in the PACITA policy brief "Multiple faces of (parliamentary) technology assessment institutions" (PACITA 2014).
- 2) This paper is based on the results of task 2.1. "TA practices in Europe" of the European Commission funded PACITA project (Ganzevles/van Est 2012; Ganzevles et al. 2014; PACITA 2014). PACITA stands for Parliaments and Civil Society in Technology Assessment. The project's aim is to stimulate reflexivity on PTA in European regions and countries with and without established PTA organizations.
- 3) In the literature on PTA, the word "model," e.g., the OTA model, is regularly used to characterize certain "practices of involvement among experts, policy makers and the public" (Bimber, Guston 1997, p. 130), which van Eijndhoven (1997) names TA paradigms. Our ambition is bigger. We want to make explicit how PTA practices on the institutional, organizational and project level are characterized by their bonds with four social spheres: parliament, government, science and technology, and society. As a result, eight PTA models can be distinguished (see note 8). The PTA model that characterizes a certain PTA institute can be determined using a set of nine specific interaction mechanisms (see section 3).
- 4) In this context, the sphere of "society" is used as an umbrella term for the spheres comprising citizens, nongovernmental organizations, and the media. Businesses may play a role in the spheres of science and technology and of society.
- 5) Note that the institutional arrangement of the Danish Board of Technology changed when it was newly installed in 2012. In the PACITA project this new foundational structure is taken into account.
- 6) Note that at present there is no TA institution in Flanders. The former PTA organization in Flanders, named IST, was abolished January 1, 2013. The institutional arrangement before that date was described in the PACITA project.
- 7) Currently there is no TA institution in Flanders. In the French part of Belgium, Wallonia, a law is under consideration that would install a TA organization by 2015 (see Delvenne et al. in this volume).

- 8) Since PTA, by definition, is TA specially aimed at the Parliament, eight models of PTA can be distinguished: mainly parliament involvement, shared parliament-government involvement, shared parliament-science involvement, shared parliament-society involvement, shared parliament-government-science involvement, shared parliament-government-society involvement, shared parliament-science-society involvement, and shared parliament-government-science-society involvement. If one would look for models of TA in general one would find an additional seven models, including for example mainly government involvement, mainly science involvement, mainly society involvement or shared government-science involvement. In total fifteen models of (P)TA theoretically exist.
- 9) Given the fact that there are eight potential models of PTA, the following four PTA models were not identified in the PACITA project: shared parliament-government involvement, shared parliament-society involvement, shared parliament-government-science involvement, and shared parliament-government-society involvement.

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De- and Re-Institutionalizing Technology Assessment in Contemporary Knowledge-Based Economies

A Side-by-Side Review of Flemish and Walloon Technology Assessment

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This article illuminates the potential role of technology assessment (TA) in knowledge-driven science, technology and innovation (STI) regimes by providing a comparative review of Flemish and Walloon TA. It draws critical attention to the ways in which TA actors and institutes in Flanders and Wallonia position themselves, or are positioned, in relation to dominant innovation policies and large-scale political transformations, notably the convergence of STI around the knowledge-based economy (KBE) and the regionalization of STI policy in Belgium. The article's findings shed light on the Flemish government's recent decision to close its parliamentary TA institute and the institutional expansion of TA in Wallonia and elsewhere in Europe. It argues that TA has politics, as TA in Flanders and Wallonia aligns with the advent of strategic science and is also affiliated to specific political parties. As these considerations run counter to the dominant representation of TA as a neutral governance tool that serves the needs of all STI decision makers, they draw into question the viability and utility of TA within contemporary KBEs.

Introduction

Today, industrialized nations and regions invest increasing amounts of public resources in science and technology. Flanders and Wallonia are no exception to this general trend. Originally unified with the regions of Brussels under a common Belgian government and administration, Flanders and Wallonia have developed their own science, technology, and innovation policies. While these policies serve Flemish and Walloon policymakers and innovation actors (e.g. politicians, captains of industry, enterprises) as a lever for regional economic development and regional self-assertion (Delvenne 2011; Delvenne et al. 2013), they also increasingly converge around the global knowledge-based economy narrative. Accordingly, both regions presently structure their STI policies around the KBE principles of knowledge accumulation and market-driven innovation. In Flanders, this represents an effort to become a “leading innovation region” (VIA 2006) that can compete with the best innovation economies in the world, while in Wallonia a vision is projected of the region becoming “the architect of its own fate” (GW 2005, p. 3). As stated in the Walloon government's 2005 Marshall Plan,¹ “economic recovery should bear on innovation and industry-university partnership within a European Knowledge Society/Economy” (GW 2005, p. 22).

Taking these local and global market-driven imperatives as its entry points, this article renders explicit how STI in Flanders and Wallonia is affected and, potentially, transformed by *technology assessment*. Broadly defined, TA encompasses activities and programs that extend and deepen the knowledge base of contemporary KBEs, often beyond purely economic and commercial interests (van Oudheusden et al. 2014). As we illustrate in this article, initial Flemish TA initiatives in the 1980s challenged technology-centric, market-led innovation policies for failing to consider the wider social, ecological, and ethical ramifications of technology. By deepening and broadening traditional, usually linear, views of innovation, Flemish TA has evolved with Flanders' transition to a knowledge-driven economy that seeks to be competitive *as well as* sustainable, inclusive, and democratic (VIA 2006).

Conversely, in Wallonia, due to the institutional fragmentation of STI competence across overlapping communal and regional substate entities, the absence of TA is linked to the belated emergence of a socioeconomic context that is conducive to knowledge-driven innovation.² Over the last fifteen years, however, STI policies have dramatically evolved and even become a cornerstone of Walloon regional policymaking. As we will see, these shifts were accompanied by a rise of interest in TA on behalf of Walloon governing bodies and policymakers.

To put these considerations in due empirical and comparative perspective, we retrace the emergence and evolution of Flemish and Walloon TA in connection with regional innovation

policy. We draw on accounts provided to us by policy analysts and spokesmen, industry research leaders, trade unionists, civil servants, parliamentarians and academics very knowledgeable of regional, Belgian, and European innovation policy and TA, as well as information taken from the secondary literature on innovation policy and TA. We stress that this study does not fully map the policy debate on STI in Flanders and Wallonia. Rather, the emphasis is on TA actors and processes, and particularly on TA's institutional uptake and the potential impact on STI policymaking.

Our review brings a macrosociological and political sensitivity to bear on TA and STI processes. We suggest that TA processes both enact as well as counteract dominant STI policies and justifications, and typically do so at the intersection of sociotechnical spheres, policies, and temporalities. How TA communities position themselves or are positioned by innovation actors (e.g. politicians, industrialists, the media) in relation to dominant policy paradigms (e.g. responsible research and innovation and the KBE) is particularly relevant for consideration in view of the Flemish government's 2012 decision to close its parliamentary TA agency, the Institute for Society and Technology. It is also important in view of recent attempts to set up a Walloon parliamentary TA institute. Whereas the Flemish decision appears largely out of sync with the growth and development of TA activity across Europe,³ it coincides with the recent transformation of the iconic Danish Board of Technology into a nonprofit trading foundation.

Technology Assessment in Belgium

Since the 1970s, constitutional reforms have gradually transformed Belgium from a unified state into a federal one with communities, regions, and language areas. The reforms were enacted as a means of finding constitutional and legal solutions for the problems between the country's Dutch and French speaking communities. As a consequence of these reforms, the STI regime (Delvenne 2011; Fallon 2011) in Belgium came to be decentralized, based on a horizontal division of policy domains between the regions of Flanders (in the north), Wallonia (in the south), and the Brussels capital region (in the center). Each entity now pursues, develops, and implements its own STI policies, more or less independent from the federal state and from one another. For instance, in 2003, Flanders launched its *Innovation Pact*. In 2005, Wallonia launched its *Marshall Plan* (since 2009 known as *Marshall Plan 2. Vert*), while Brussels initiated a *Regional Innovation Plan*.

The Roots of Flemish TA

Although Flanders is presently the economically richer region, it lagged behind Wallonia until the middle of the twentieth century. The region gradually became more prosperous than Wallonia after the Second World

War, following the decline of Wallonia's "old" coal and iron industries (Halleux et al. 2009). When the first ever Flemish government came to power in the 1980s, it made attempts to boost Flemish economic self-awareness and position Flanders as an industrial, entrepreneurial and highly technological region (Oosterlynck 2006, p. 98). A determining figure in this transformation was the then chair of the Flemish government, Gaston Geens. Geens launched "DIRV", which stands for *Derde Industriële Revolutie Vlaanderen*, literally Third Industrial Revolution Flanders.

The program lent support to various "basic" and "applied" technologies, including the highly promising and already emanating fields of biotechnology, new materials, and microelectronics. Less perceptibly, but equally important, DIRV delivered a decisive break with economic pessimism in Flanders. It was a conspicuous campaign, which served the Flemish government as a means to present "a clear image of itself to the general public, with an offensive policy of its own, distinct from both Walloon policy and national policy" (Goorden 2004, p. 8).

Various authors and interviewees hence identify DIRV as a "keystone" not just in instigating contemporary innovation policy in Flanders, but also acknowledge its role in contributing to a range of political-economic reforms that primarily emphasized entrepreneurship and restricted Keynesian state intervention in the economy. While these restructurings emerged in response to various international and domestic trends and challenges (e.g. the linguistic conflict in Belgium), they were also the result of ideological crafting and the search for new policy paradigms (Witte et al. 1997, p. 321). It is, partly at least, against this background that ensuing programs, actions, and controversies in the Flemish innovation context should be understood, including the emergence and development of TA.

As a program of large-scale reform, DIRV met with strong opposition from the political left, including the socialist trade union ABVV (representing traditional industries, among others). One of its most vocal critics in the Flemish parliament is the socialist Norbert De Batselier. These actors criticized DIRV for its strong emphasis on entrepreneurship and small government, and its neglect of social dimensions.

In response to these criticisms, Geens conceded to the demands of the trade unions to erect the *Stichting Technologie Vlaanderen* (STV), which officially translates into Flemish Foundation for Technology Assessment. As a government-financed agency led by the social partners⁴ and embedded in the Social Economic Council of Flanders (SERV), STV's aim was to analyze the social dimensions of new technologies and advise the government on issues of science and technology (SERV 1994; SERV 1998; Goorden 1990). Shortly after STV's creation, the first TA initiatives were launched

as academic research programs. Following Goorden (2004, p. 11), we label these initiatives *early-warning TA*, as they were charged with examining the social impact of new technologies such as biotechnology and microelectronics.

Two TA Initiatives in Wallonia

The emergence of Flemish TA did not go unnoticed in the south of Belgium. In the aftermath of DIRV, the then Walloon minister of Research and Technology, Melchior Wathelet (Christian Social Party, PSC), attempted to position Wallonia in relation to Flemish innovation policy. While some Walloon labor representatives and social partners in the Walloon Economic and Social Council (CESRW) favored the erection of an institute like STV in their region, liberal and Christian-Democratic parties feared such an institute would reinforce the power of the social partners. Even so, in 1988 Melchior Wathelet proposed a study on the opportunity and feasibility of erecting a Walloon PTA institute. This study was delegated to the Research Center in Informatics and Law (CRID) at the University of Namur. The CRID team visited several TA institutions across the globe and recommended a TA model quite similar to that of the US Office of Technology Assessment, OTA. When it came to assessing this study, the CESRW pointed out that this proposition did not fit the Walloon context and the needs of potential users. In addition, it criticized the limited institutional approach and its disconnection to European evolution, especially the “participatory turn” in Denmark (Joss 1998) and the rise of constructive TA in the Netherlands (Schot/Rip 1997).

The second initiative to introduce TA came from Gérard Valenduc, then representative of the Christian trade union at the CESRW, and member of its research commission, the Walloon Council for Science Policy (CPS). In 1991, he obtained funding for a new exploratory project called Experiences of Mediation and Evaluation of Research and Technological Innovation (EMERIT) from the new minister in charge of New Technologies, Albert Liénard (also a Christian-Democrat). The idea behind EMERIT was to catch up with recent regional TA developments in other European regions (e.g., in Baden-Württemberg) and to develop TA activities based on concerted social measures. These objectives differed markedly from the original idea of supporting parliamentary decision making, centering instead on fostering the appropriate conditions for an innovation-friendly socioeconomic climate. Then, in 1994, following a conference within the EMERIT framework, Liénard announced his proposition to assign the CPS (nested within the CESRW) a TA mission. The CESRW accepted but some of its members remained suspicious about TA, an activity it had not been prepared for. After completing four studies, the CPS in 2002 decided to abort its TA mission, considering that it had not succeeded in attracting the attention of its main addressees, the Walloon parliament and government. In fact, the CPS never received any

demands for formal TA from its addressees. Its most successful activities were those dedicated to the popularization of science, which were not tailored to meet their users’ political needs and failed to move the social debate forward (Delvenne 2009).

Bottom-up and Interactive TA in Flanders

Meanwhile, in Flanders another STI policy vision came to the fore. Flemish policymakers, innovators, and entrepreneurs asserted that Flemish innovation policy needed a more integrated take on innovation that acknowledges the complex interplay between science, technology, and other, nontechnical groups of actors, such as social and economic sectors. Policymakers therefore called for a kind of bottom-up TA, which they described as an approach “that may not slow down or have a negative influence on creativity and the innovation process”.⁵ To this end TA activities had to be organized in close interaction with R&D efforts in governmental technology programs on biotechnology, new materials and energy, and environmental technology. The expectation was that if TA were conducted in direct consultation with science and technology producers, research would lead to socially useful applications.

Their successive bottom-up experience with relegating TA to R&D projects and technological programs led scientists and technologists to think critically about their research activities. However, because the institutional context for R&D did not systematically offer any incentives to civil society, as well, to reflect on technological developments, the palette of contributed perspectives shrank to those areas that are considered most relevant to scientists and engineers, notably safety and health risks, and market opportunities.

In order to create a more interactive type of TA in which Flemish civil society, as well as citizens, participate through a deliberative process, in 2000 TA was assigned to an institution advising the Flemish parliament, the Flemish Institute for Science and Technology Assessment (viWTA, later renamed the Institute Society and Technology, IST, before the institute’s closure in 2012; Delvenne et al. 2012). The institute adopted a twofold mission: to stimulate social debate on sociotechnical developments, and to inform and advise MPs on the social, ethical, and economic implications of scientific-technological developments. To these ends, viWTA initiated participatory activities within and outside the Flemish parliament (e.g., citizen workshops, public debates, and technology festivals).

It is important to note that with the erection of viWTA, TA was removed from the R&D enterprise itself. That is, in contrast to several STV programs and early-warning TA initiatives mentioned above, TA was not fully ingrained in

the innovation process. Rather, TA took place in a different location and time, namely in a parliamentary setting.

The Rebirth of Parliamentary TA?

Ironically, a few years before the IST's closure, TA again gained momentum in Wallonia.⁶ A political scientist at the University of Liège (and coauthor of this article), Pierre Delvenne, initiated contact with Walloon policymakers with the aim of raising awareness about TA (Delvenne 2009; Delvenne et al. 2012). After having initiated a series of interactive workshops involving government officials, consultative groups, labor unions, and others, about the prospects of TA in Wallonia, a Walloon MP by the name of Joëlle Kapompolé (Socialist Party) publicly announced a proposal for a parliamentary decree to found a TA institute linked to parliament. Other MPs, as well as the former minister for New Technologies and Research declared they would support the proposal. Subsequently, in November 2008, it was stated that a special line of funding would be considered. According to the proposal, the TA institute "should make use of participatory methods and function as an exchange and discussion platform for constructive social debate on technological options without being an obstacle to technological development". However, several issues remained to be clarified. During the 2009 regional elections, the Socialist and Ecologist parties included the concept of a TA institute in their programs.⁷ After the elections, when a political majority comprising Socialists, Ecologists, and Christian-Democrats was installed, the establishment of a TA institution became part of the government's agenda.

In May 2011, the ministers Jean-Claude Marcourt (Socialist, in charge of new technologies) and Jean-Marc Nollet (Ecologist, in charge of research and science policy) referred to Kapompolé's initiative to announce a joint initiative for a full-fledged Walloon Institute of Technology Assessment. They emphasized its role for policymaking as well as its potential contribution to stimulating societal debate on science and technology. They also underlined that the new institute should function as a completely independent office within parliament and would rely on a network of experts. Government and parliament were identified as the main users of the TA structure, and to a certain extent it was even suggested that organized citizen groups would be able to ask the TA office to commission TA studies. Furthermore, the joint initiative emphasized the importance for the future structure to mobilize participatory methods, a procedure that is relatively uncommon in Wallonia.

However, political tensions between the two ministers in charge led to a blockade of the project for almost two years. These tensions were related to divergent political visions regarding the future of Wallonia rather than to

opposing perspectives on TA. The main issue concerned the addressees of the TA institute: As a convinced regionalist, Marcourt wanted the TA institute to work exclusively for the Walloon region (and thus for the Walloon region's parliament and government). Nollet, on the other hand, demanded that the institute address the parliament and government of the French Community as well. Whereas the regionalist argument underlined the territorial differences between Brussels and Wallonia, the integrationist vision highlighted regional incorporation. Accordingly, Nollet planned to establish a new science policy across the whole of Wallonia-Brussels and had similar plans for TA. It took both ministers' cabinets about two years to reconcile their seemingly incompatible views.

Despite this blockade, throughout 2013 several MPs from the major political fractions consulted the SPIRAL Research Centre at the University of Liège to help initiate the establishment of a parliamentary working group on TA in the Walloon parliament. The SPIRAL unit (supported by the PACITA project) responded by setting up a series of "Technology Assessment working lunches"⁸ aimed at raising awareness of TA among MPs and their collaborators (van Oudheusden 2013). These sessions were dedicated to a TA simulation exercise on a topic of interest to MPs (e.g., aging populations, cloud computing, sustainable consumption) in order to jointly explore how TA can inform and support parliamentary work on STI. As the TA working lunches were generally well received, the parliament's president Patrick Dupriez (Ecologist) joined Joëlle Kapompolé and her colleagues from the parliamentary working group to write another decree proposal to establish a TA institution serving parliament and government, again with the support of the University of Liège. At the end of the legislature, a full-grown decree was approved in the plenary session and put on the agenda of the committees in charge of research, economy, and new technologies. However, at the end of the legislature in spring 2014, parliament was dissolved before the concerned committees could pass the decree. As a consequence, the decree presently remains in limbo in the legislative process.

Discussion

The historical overview above allows us to pinpoint and compare defining characteristics of Flemish and Walloon TA, partly in light of recent TA developments across Europe.⁹

To begin with, it is striking that both Flemish and Walloon TA emerged and matured in a strategic, knowledge-centered STI environment, i.e., an environment that forges new alliances between the scientific establishment, policymakers, and societal actors for the sake of science-driven economic development. In fact, Walloon TA did not mature *until* such a strategic science regime was firmly in place, bringing to the fore systemic approaches to innovation and university-industry

partnerships (Fallon/Delvenne 2009). Thus, the institutionalization of TA may well *depend* upon the emergence of strategic science as a new mode of knowledge production (Delvenne 2011). Following Rip (2000), strategic science heralds a shift in scientific knowledge production from relatively isolated, “basic”, academic research, to research that is economically and socially relevant and that can only be understood within a context of its use. TA potentially transforms this context by bringing more diverse epistemic cultures and “knowledges” into STI processes. Knowledge here no longer only refers to intellectual property, technological applications, and scientific theories, but also, and increasingly, to new kinds of expertise (e.g., sociological, lay, indigenous), to new forms and manifestations of relevance (e.g., social and ecological concerns), and the democratization of sociotechnical culture at large (Knorr-Cetina 1999, p. 8; Bijker 1995). TA can thus contribute to broadening, deepening, and governing knowledge in contemporary KBEs, which is precisely what STI policymakers and various innovation enactors claim innovation is, or *should be*, about.¹⁰

The emergence of the EU-wide Science in Society projects like Parliaments and Civil Society in Technology Assessment (PACITA 2011–2015) lends weight to the above hypothesis.¹¹ While it is too early to determine the policy impact of PACITA, it is important to note that PACITA is designed to facilitate “coordination and networking activities, dissemination and use of knowledge” in support of research activities and policies. In fact, PACITA is construed as a “Mobilisation and Mutual Learning Action Plan [that] will distribute capacity and enhance the institutional foundation for knowledge-based policy-making on issues involving science, technology and innovation (...)”.¹² The potential influence of PACITA is felt in Wallonia, which in contrast to Flanders has never institutionalized TA, but which now explicitly gears its STI policy towards the KBE and strategic science (Plan Marshall 2. Vert; Plan Marshall 2022).

It would thus appear that TA not only relies on, but *thrives in*, the context of knowledge-driven innovation. However, if TA is to exert a *lasting* influence in the KBE, TA actors must clearly present TA’s credentials as a decisive knowledge player to policymakers and innovation actors. We return to this point shortly.

Second, Flemish and Walloon TA tap into a political culture that emphasizes the importance of concerted social action. In Belgium, collective bargaining between trade unions, employers’ organizations, and governments is an important political and social tradition that allows TA practices to gain a firm foothold in multilayered, consociational democracies (Lijphart 1977). The erection of the Flemish TA institute STV in response to the DIRV campaign and the lodging of a Walloon TA mission in the Economic and Social Council (CESRW) in the 1990s illustrate this point, as trade unions demanded their say in STI policymaking.¹³ Seen in this way,

TA can arbitrate between scientific, political, and social worlds. When TA is integrated into R&D settings (e.g., Flemish technology action programs) and/or embedded into parliaments or other formal policymaking bodies, it can open new negotiation practices and establish a more integrative and inclusive decision-making culture.

However, the institutionalization of TA also entails risks. As noted earlier, when the IST (formerly viWTA) was installed in the Flemish parliament in 2000, TA was physically removed from the R&D process. Thus, while TA gained a foothold within formal Flemish policy circles, it became less ingrained in scientific and technological research activities across the region. In addition, as Horst (2014) argues in relation to the restructuring of the DBT by the Danish government in 2011, when TA is embedded within formal policy-making bodies and processes, it risks being domesticated or “tamed”. This is because established organizations may find it hard to change, adapt, and reposition themselves to meet new needs in complex and changing environments (Gubrium/Holstein 2001). As Horst notes, in Denmark democratic debate about science and technology lost momentum *after* the DBT’s institutionalization in 1986. In the years that followed, Danes came to take debate of this kind for granted. In fact, many Danes appeared ignorant of the DBT’s existence in spite of its high international visibility.

Whether or not similar assertions can be made about the closing of the Flemish IST is an open question, which we do not delve into in this article. Rather, we want to draw attention to the political affiliations of Flemish and Walloon TA. As illustrated by the erection of STV in 1984, Flemish TA emanated on the left side of the political spectrum, specifically among the green and socialist parties. The same political families initiated parliamentary TA, which led to the erection of viWTA (IST) in 2000. Arguably, in Wallonia the politics of TA are not so outspoken or visible. Yet, it should be noted that the Socialist and Ecologist factions took the initiative to institutionalize TA and that TA is typically associated with a political preference for more participatory or deliberative modes of decision making. These preferences are not neutral. They have been reproduced in a great number of other European countries where left-wing political parties play, or played, a key role in institutionalizing TA (Delvenne 2011). As noted elsewhere (van Oudheusden 2014), TA’s political affiliations are often denied or downplayed across TA communities. TA is typically framed as an analytic activity aimed at providing decision makers with an objective analysis of a technology (van Eijndhoven 1997) and/or as an interactive and communicative tool that aims to enrich the basis for public debate and STI decision making (Decker/Ladikas 2004). These broad designations (i.e., geared towards all political factions and to the benefit of all innovation actors) risk trivializing and undermining the very policy changes TA advocates seek to instigate when TA is associated with *specific* political parties or politicians.

The above considerations deserve to be taken into account, as they shed light on how and why TA is institutionalized (or conversely, de-institutionalized), and how TA is enveloped in broader STI processes, such as the EU-wide shift towards responsible innovation (von Schomberg 2011). They are also helpful when reflecting on the evolving viability and utility of TA within contemporary KBEs, as TA and STI processes have coevolved as “dancing partners,” relatively independent from one another and yet in continuous interaction (Rip 1992). The Flemish and Walloon TA experiences described in this article can thus serve TA communities, STI policymakers, and innovation scholars as entry points to ponder the role, place, and orientation of regional, national, and European TA in the years ahead.

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Notes

- 1) Marshall Plan is the name given to a broad socioeconomic policy program that intends to revitalize the Walloon economy along the lines of innovation, entrepreneurship, and creativity.
- 2) In a case study approach to “expanding the TA landscape in Wallonia”, Delvenne et al. (2013, pp. 283–284) provide a more detailed account of the institutional fragmentation of STI competence in Belgium. They point to differences between Flanders and Wallonia that hindered the emergence of KBE rationales in Wallonia.
- 3) Notably through the EU-wide Framework 7 project Parliaments and Civil Society in Technology Assessment (PACITA), on which more follows below.
- 4) The term “social partners” is often used in Belgian policy discourse and encompasses employers’ organizations and trade unions. These actors are regularly engaged in formalized and structured socioprofessional negotiations following the political model of consociationalism (Lijphart 1977).
- 5) Technology Note of the Flemish government (1994).
- 6) It is worth noting that the closure of IST hardly drew policy attention in Wallonia, whereas TA, as a topic of interest, did. This says much about the effects of regionalization of Flemish and Walloon STI policy and the public scope of debates on science in society in Belgium.
- 7) In Wallonia and Brussels, the green, or environmentalist, political party is called Ecolo, which is short for the French word *écologiste*.
- 8) Prior to these TA working lunches, an international conference was held in the Walloon parliament (March 8, 2013), which gathered former and actual directors or senior staffers from TA institutions in the United States and Europe. See van Oudheusden (2013) and the event’s website, <http://tapw.wordpress.com/>, last accessed on September 3, 2014.
- 9) These reflections build on and are further developed in van Oudheusden et al. 2014.
- 10) Consider the many EU policy discourses on integrating science in society for the sake of good innovation governance. For instance, in a 2013 Expert Group Report to the EU’s Directorate General for Research and Innovation, we read that “The [Responsible Research and Innovation] approach has to be a key part of the research and innovation process and should be established as a collective, inclusive and system-wide approach” (http://ec.europa.eu/research/science-society/document_library/pdf_06/options-forstrengthening_en.pdf).
- 11) See <http://www.pacitaproject.eu>.
- 12) See the EU CORDIS website: http://cordis.europa.eu/project/rcn/98487_en.html
- 13) The aforementioned EMERIT project sustained the idea of enlarging the social dialogue to encompass science and technology issues, with the participation of civil society, while acknowledging the formalized and structured social dialogue typical of the Belgian model of concerted social action.

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No Countries for Old Technology Assessment?

Sketching the Efforts and Opportunities to Establish Parliamentary TA in Spain and Portugal

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If the question is whether there is a parliamentary technology assessment (PTA) unit in Portugal or Spain, the clear answer is that there is still no such unit at the central state level at the present time, neither in Portugal nor in Spain. The question then has to be modified addressing previous and current efforts to establish PTA and the current framework conditions and opportunities. Practices of PTA are framed here as a democratic innovation in the context of changes in representative democracies. Against this backdrop, the efforts and opportunities to establish PTA in Spain and Portugal are studied. By sketching these developments and outlining the opportunities in these countries, our aim is to contribute to the debate about the likelihood of a new wave of PTA in Europe (Hennen/Nierling 2014).

Introduction: Parliamentary Technology Assessment as a Democratic Innovation

Attempts at identifying parliamentary TA units and TA activities in various countries presume a prior understanding of what TA and, more specifically, what PTA is.¹ Essentially, TA has to be approached as an analytic or scientific *and* a democratic practice (van Est/Brom 2012). As the former, it is concerned with dynamic and complex sociotechnical issues from the perspective of political relevance. It incorporates knowledge from the sciences and also nonscientific knowledge, and employs methods from the social sciences to acquire this knowledge. As a democratic practice, it contributes “to the formation of public and political opinion on societal aspects of science and technology” (Bütschi et al. 2004, p. 14). It is worth highlighting the two addressees: the political system *and* the public sphere. Since TA studies are publicly available, they can be scrutinized and criticized by everyone, for instance by political parties, civil society organizations, entrepreneurs, and scientific communities.

In order to consider the viability and desirability of TA in various countries with their specific social, political, economic, and cultural settings, TA should be introduced as a *democratic innovation*. We elaborate this assumption a little bit further because it offers a new perspective for looking at the opportunities for PTA in Portugal and Spain. This concept allows for TA to be, first, situated historically in the broader context of the current transformations of Western representative democracies and, second, to be analyzed by employing concepts stemming from innovation studies, such as opportunity structures, political entrepreneurs, innovation networks, and failed innovations.

In the last decades many Western democracies “have experimented, tested, and implemented innovations with the aim of enhancing the working and quality of democracy as well as increasing citizens’ political awareness and understanding of political matters” (Merkel 2008, online). Scholars of the transformation of democracy have come up with different concepts for designating the new forms that have emerged: “contestatory democracy” (Pettit 1999), “advocacy democracy” (Dalton et al. 2003), “responsive democracy” (Teorell 2006), and “monitory democracy” (Keane 2009a; Keane 2009b).

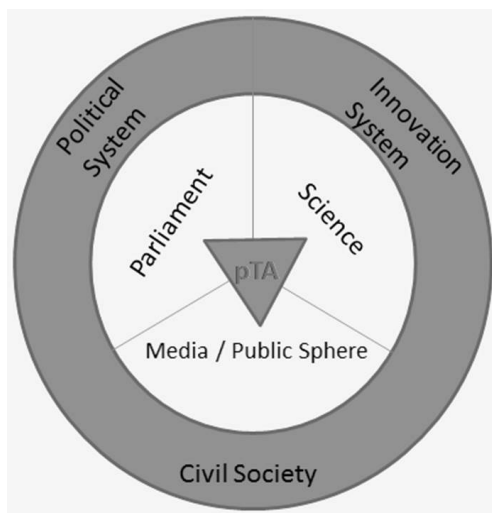
They all contain elaborations of the basic idea that political control in democratic societies and thus “the whole architecture of self-government” (Keane 2009b, online) is changing. Self-government, as Scharpf (1997, p. 19) has pointed out, is about collectively binding decision making (input legitimacy) *and* effective state control (output legitimacy). Keane, stressing the control aspect, explains the concept of “monitory democracy” as an emerging historical form of

democracy “in which power-monitoring and power-controlling devices have begun to extend sideways and downwards through the whole political order” (Keane 2009a, online).

It has to be added that the new power-scrutinizing mechanisms, and PTA as a case in point, are closely related to the public sphere. The public sphere today has to be understood as a communication space to which the media and the general public contribute, as does parliament.² The public sphere represents the context in which problems that must be solved (= policy relevant problems) are discovered, and the public has the legitimate expectation that these problems are dealt with in a rational and accountable way by the government and that the appropriateness and effectiveness of the measures taken is watched over by parliament and public sphere. PTA (like parliament) is located within this loop of the public perception and articulation of problems and their political processing. TA can serve as a scrutinizing mechanism supporting parliament's function of controlling government and can contribute to the formation of public opinion and political will.

The changes in representative democracies that have taken place during the past few decades constitute the appropriate broader perspective for observing and understanding the emergence of PTA. If we acknowledge that PTA serves the identification and articulation of technology-related societal problems *and* the parliamentary control of government policies, its potential role in a monitory democracy becomes clear. TA, independent of its many varieties of implementation, can be understood as a democratic innovation involving parliamentarians, scientists, and the public sphere. In figure 1, we graphically depict the narrower and wider context of PTA.

Fig 4 - 2. PTA in Context



Source: Diagram by the authors

A look at the narrower and broader context is necessary to reveal the opportunity structures and the barriers to establishing PTA as a democratic innovation. The outer

circle comprises the more general framework conditions and the dynamics at the level of the political system, at the level of civil society, and in the science and innovation system. The more specific inner circle points to the most relevant interfaces and relations of PTA.

According to Hennen/Nierling (2014, p. 3), in the 1970s and 1980s there was obviously a favorable opportunity structure, which eventually led to the institutionalization of PTA in *some* of the wealthier and highly industrialized European countries – referred to often as the first wave of PTA. Getting a bit more specific, but still at the level of constructing an ideal type of opportunity structure, Hennen/Nierling indicate the requirements at different levels: a highly developed and differentiated system of research and development (R&D) with a strong and visible commitment from the government and a strong parliament establishing corresponding parliamentary structures, e.g., a standing committee on science and technology. Further, parliament has to become aware that it needs independent support from the best available scientific knowledge to fulfil its function, and the science sector needs to be engaged in problem-oriented research (systems analysis, risk assessment, STS, ethics etc.) and prepared to provide policy advice in the form of technology assessment. Last but not least, other matters regarded as an element of the opportunity structure are a public sphere with an interest in S&T issues and a demand by citizens, civil society organizations, and social movements to have a say in decision-making processes in science and technology (cf. Hennen/Nierling 2014, p. 3). Analyzing the cases of Spain and Portugal we will bear this in mind.

Case Study: Spain

Social and Economic Background

After a traumatic civil war (1936–1939) followed by almost 40 years of dictatorship with long-lasting effects on the political culture, Spain's transition to democracy in the second half of the seventies took place within a few years. In November 1975 Franco died, and in December 1978 the new constitution came into effect. This speedy and relatively smooth transition has been admired by many observers.³ The social and economic perspectives were bright, the expectations high, and the catching up process of the Spanish research and innovation system was further strengthened by Spain's membership in the European Community in 1986.

The economic crisis has been palpable since 2008, hitting Spain hard and revealing profound weaknesses in its innovation system. The Spanish government is addressing these challenges by adopting a new Law for Science, Technology and Innovation in 2011, which was followed by a Spanish Strategy for Science, Technology and Innovation (2013–2020) and the Spanish State Plan for Scientific and Technical Research and

Innovation (2013–2016), adopted in February 2013 (cf. Fernández-Zubieta 2014, pp. 12–17).⁴ The structural deficits of the Spanish research and innovation system have been the subject of many studies, which have also included recommendations regarding how to change the old model (see for details, instead of others, ERAC 2014; Fernández-Zubieta 2014; Cotec 2013; OECD 2014). One significant indicator showing the profoundness of the crisis in a nutshell is the unemployment rate of young persons (under 25), which was at 53.7 % in August 2014, the highest rate of the 28 EU members (Eurostat 2014).

The crisis Spain is experiencing is also a political crisis. Political disaffection is directed primarily at the two major political parties (PP and PSOE), which dominate Spanish politics. They are accused of being corrupt and incompetent (cf. Feenstra/Keane 2014, online). As both parties are corrupt, the bone of contention is which party is more corrupt than the other (Nohlen 2012, p. 156). Various authors also confirm that these parties tend to perpetuate the long-standing dichotomous narrative of the “two Spains”, which both employ in political conflicts to attribute guilt or responsibility and to explain why reconciliation or sociopolitical integration is not possible in Spain (Juliá 2004; Kühn 2012). The observation that the media often position themselves close to the positions of political parties adds to this picture (Nohlen 2012, p. 149).

In general terms, the political system is assessed as being insufficiently sensitive to social demands (cf. Jiménez 2011, p. 63) and as divorced from civil society (Oñate 2013, p. 49). The distance of citizens from formal politics is confirmed by empirical research about Spain’s political culture. Research used to find a rather low level of interest in politics among the population in general and a low level of political participation of various forms compared to other European countries, but a very high level of collective forms of participation like the signing of mass petitions, strikes, and especially demonstrations (Torcal et al. 2006, pp. 16 et seq.; Gómez/Palacios 2012, p. 506; Font/Méndez 2008, pp. 546 et seq.). Demonstrations increased after 1986, and increased even further after 2000 (Jiménez 2011). This pattern of participation reached a new level with the citizen movement known as the 15-M movement (referring to May 2011, when massive social protests started in the streets).

Feenstra/Keane (2014) have analyzed this movement as a push towards “monitory democracy” and taken stock of the changes brought about so far by this movement in terms of power-scrutinizing mechanisms. They mention, for instance, the formation of “anti-party” political parties (e.g., Podemos), making use of legislative citizen initiatives, the creation of independent newspapers and electronic media fostering investigative journalism, and internet platforms scrutinizing parliamentary work. Oñate compares the 15-M movement to the

protest movements in other European countries in the sixties and seventies. He holds that this movement may change politics in Spain, bringing about more responsiveness, accountability, and transparency of politics and more channels of participation for citizens.

The parliament in Spain is relatively weak for two main reasons. On the one hand, party discipline of MPs is very strong, and on the other hand, the power of the prime minister is so strong that scholars of political systems tend to classify Spain as a semi-presidential democracy (Friedel 2010). This state of affairs is a legacy of the transition, which for good reasons aimed to prevent institutional instability and political fragmentation, and therefore favored strong parties, easy obtainable parliamentary majorities, and strong governments. The general framework of relations between government and parliament followed an orientation emphasizing security instead of liveliness (Guerrero 2005, p. 12). The list of necessary political reforms is long, including the proposal to extend the parliamentary advisory structure since the parliament should not depend entirely on information provided by government and be able to receive expertise from professionals from different disciplines (ibid., p. 18).

TA Initiatives in the Context of R&D Policies

The efforts to establish TA in Spain at the level of the general parliament have not been thoroughly studied. The history of these intentions and attempts, however, is important as it constitutes one element of the current opportunity structure. There are some indications that there have been repeated efforts from 1989 to the present day.

In synchrony with the first wave of TA in Europe, a new “Law of Science” was adopted in Spain in 1986, which is regarded as providing the institutional structure offering various possibilities for implementing TA. To establish TA at parliament was just one option at that time. Luis Sanz, one of the most distinguished scholars of research policy, held that the Advisory Council of Science and Technology (CACT) was the “institution with the greatest chance of performing an independent technology assessment role” (Sanz/Goicolea 1987, p. 16). Following the Law of Science, this body should become the effective link between the scientific community, social agents, and policy makers in order to achieve R&D policies appropriate to the different interests and needs of society. Another realistic option would have been ANEP, the National Agency for Evaluation and Foresight (Agencia Nacional de Evaluación y Prospectiva) serving the Interministerial Commission for Science and Technology – provided it would have been sufficiently independent (Sanz 1989, pp. 167 et seq.).

The protagonist of the first parliamentary initiative was Miguel Ángel Quintanilla, who was a senator at that time and the president

of the Mixed Committee of Congress and Senate on Science and Technology, which had been established based on the “Law of Science” mentioned above. He proposed to create an Office of Scientific Advice (*Oficina de Asesoramiento Científico*). But the proposal foundered as it could not be substantiated within the legislative period before the elections of October 1989. The contributions to an international seminar on the institutionalization of TA in Spain, which was organized by the Senate (Quintanilla 1989) and took place before the elections in 1989, suggests that there was no strict dividing line between those who were in favor of a parliamentary TA unit and those who preferred advisory bodies related to the executive power. The joint ambition of the participants was to introduce TA in the political system.⁵ Against this Spanish background, Sanz has always pointed out the enormous importance of the institutional setting when reflecting the right place for TA in the political system (Cruz/Sanz 2005). It also appears that in Spain the idea of TA was more focused on the evaluation of R&D policy than elsewhere (cf. Sanz 1995; Fernández 2011).

Looking at foresight (competing with or complementing TA) as an element of the opportunity structure for TA in Spain at that time, we see the Observatory of Industrial Technology Foresight (*Observatorio de Prospectiva Tecnológica Industrial, OPTI*), which was created in 1997 by the Ministry of Science and Technology with the aim of carrying out foresight studies and technology watch with a focus on technological trends and the needs of Spanish industry (Böhle 2003). Subsequently, the Observatory of Sustainability in Spain (OSE) and a Unit of Analysis and Foresight were created, the former in 2005 and related to the Ministry of Environment and the latter in 2006 by the then Ministry of Agriculture, Fisheries and Food (EEA 2011, p. 7). But overall, as the EEA remarked when taking stock of Foresight in Spain, foresight is “far from influencing policymaking” and has not been “institutionalized as a tool for policymaking” (EEA 2011, p. 16). In other words, the practice of foresight in Spain cannot be seen as compensating the lack of TA.

Turning back to TA proper, a further attempt to establish TA took place in 2003/2004. Following Varela (2004) who was a member of the Committee on Science and Technology of the Senate between 2000 and 2004, a motion was approved by this Committee asking the government to give its opinion on the establishment of an Office of Scientific Advice. The government responded positively in October of the same year and even declared its disposition to cooperate with the legislative power to support the establishment of such an office, and further envisaged that this body should become a member of the EPTA Network. Other options, elaborated by Sanz, as how to embed the TA function in the institutional structure were also available at that time. Yet within this legislative period nothing was decided and nothing happened before the elections of March 2004.

In the period 2004–2008 such an office was proposed once again, this time from within the Committee of Education and Science of Congress, namely by Mercedes Cabrera (social scientist), who became minister of education and science in 2006 (CSIC 2008, p. 45).

In 2008, after the elections in March, we see that TA is still a topic. In a seminar in May (*Encuentro Nacional de Política Científica y Tecnológica*), comparable to the one in 1988, bringing together experts from science and politics, the conclusion was that a greater involvement of parliament in the national R&D system would be important and that to this end a body advising parliament in matters of science and technology was proposed. The résumé of the rapporteur also pointed out the caveats containing the many prerequisites which would have to be fulfilled in order to make such a body work effectively and reminding everyone of the earlier failed initiatives (CSIC 2008, p. 10, see also p. 24, p. 45).

Today, the Law of Science, Technology and Innovation (2011) envisages “the introduction of mechanisms of social assessment of science, technology and innovation into the Spanish Science and Technology system in order to assess the interactions between technological development and society...” (cf. Revuelta 2011, p. 25). The task of promoting such a mechanism was given to the Advisory Council for Science, Technology and Innovation. Furthermore, the scientific community was also still promoting the idea of establishing a TA unit to advise the parliament. In December 2012, the Confederation of Spanish Scientific Societies (COSCE), representing more than 40,000 scientists suggested itself as suited to advise parliament (Andradas 2012, p. 19).

While there is no story to tell about a parliamentary TA unit at the central state level, there is one success story at the level of the autonomous communities of Spain, namely CAPCIT, the Advisory Board of the Parliament of Catalonia for Science and Technology (*Consell Assessor del Parlament sobre Ciència i Tecnologia*), which was established in 2008 (O'Reilly et al. 2012). Previously, in 1999, the Catalan government had created CACIT, an Advisory Commission on Science and Technology, for its purposes. In 2003 the Parliament urged the government to formally link CACIT to the Catalan Parliament. In 2008 “an offer of scientific and technological advice was made to the Catalan parliament by the Catalan scientific community” (O'Reilly et al. 2012, p. 47), and in November 2008 CAPCIT – now with a “P” for parliament – was formally established. In 2009 it became member of EPTA.

“... CAPCIT focuses on TA and the relationship between the Catalan Parliament and science conducted in Catalonia” (Dominguez 2012, p. 132). CAPCIT is a mixed body currently composed of 20 members, 10 each representing MPs and the main scientific and technical institutions of Catalonia. All the political parties

are represented in this group, to which two members of the Presiding Board and the President of the Parliament – who is also the president of this mixed body – belong. The secretary of CAPCIT is one of the lawyers employed by parliament. In legal terms, CAPCIT is similar in nature to the intergroups of the Catalan Parliament (cf. Domínguez 2012, p. 133).

Domínguez clarifies that he does not regard CAPCIT as an instance of the “office model” of PTA, which it has often been considered in international comparisons (e.g., Hennen/Ladikas 2009, pp. 44 et seqq.; Enzing et al. 2012, p. 13). In his view, CAPCIT follows the parliamentary committee model. Following the PACITA modelling of parliamentary TA organizations, which overcomes the unfruitful distinction of office vs. committee model, the Catalan case corresponds to Model 2 “shared parliament – science involvement” (Ganzevles/van Est 2012, p. 198, p. 216; see also Ganzevles et al. in this volume). The parliamentary TA organizations in Germany and the UK and of the European Parliament fall into the same category. CAPCIT does not directly provide TA. The scientific and technical institutions represented in CAPCIT are usually commissioned to produce reports and to provide advice.

One peculiarity of CAPCIT is that there is no designated staff. Staff working for parliament has to do the administrative work (O’Reilly et al. 2012, p. 51). It also has no budget of its own and therefore depends on existing parliament resources for support (ibid., p. 48). The studies are paid by the institutions performing them. It is also noteworthy that the studies completed do not have to correspond to predefined standards and are not made available to the public by parliament. The research organizations, however, may consider publishing them on their own. The production of TA studies – an average of less than one finished study per year – is obviously not the strength of this TA institution. The impact and the role of CAPCIT in politics and the level of awareness among MPs is regarded as rather limited (ibid., pp. 49 et seqq.). This could be said of other TA bodies too. The relevant point is to see that CAPCIT represents a unique institutional form of an interface between the heads of science organizations of a region and the regional parliament. The following description of CAPCIT by its secretary is telling:

CAPCIT itself is a forum that can be seen as a way to bring together the political and scientific worlds. Equally important as the information and scientific reports it provides is the opportunity for MPs and scientists to meet and thus to personally and directly present their ideas and visions. CAPCIT can foster mutual trust between scientific and technical institutions and the Parliament of Catalonia (Domínguez 2012, p. 134).

Current Opportunity Structure

Regarding the opportunity structure for TA in Spain, we hold, as a hypothesis to test, that Spain has all it takes to institutionalize TA – even if it today seems hard to find catalyzing TA evangelists and entrepreneurs who could turn mere contingency into opportunity, and even if the economic crisis, a lack of societal awareness and the political will of the relevant actors make it unlikely to happen soon.

Considering the political sphere, we find that there have been advisory bodies in the field of science, technology, and innovation policy continuously since 1986, which have allowed the scientific community to provide advice which may have included TA too. Gómez et al. (2014, p. 455) even wonder about the poor state of TA in Spain given the many potential actors who could have assumed this task. It is not far-fetched to think that what happened in Catalonia – i.e., the transformation of a governmental advisory body into a body (also) serving parliament – could have happened at the central state level, too.

A difference might be that the parliament in Catalonia is somewhat stronger, that the scientific sector in Catalonia is more influential, and that the idea to implement this democratic innovation even earlier than the central state – including the prospect of EPTA membership – was appealing. European encouragement could be the key to creating the necessary momentum for the institutionalization of TA at the central state level. Think for instance of the involvement of Spanish MEPs, a broader integration strategy of EPTA, a role for the JRC with its Institute for Prospective Technological Studies (IPTS) in Seville, and the participation of more Spanish research institutes in Horizon 2020 projects, e.g., on RRI (responsible research and innovation).

Looking at civil society and the public sphere, it is undisputed that there is an absence of a strong environmental and antinuclear movement and a low level of demand articulated by the public for it to participate in technology policy decisions (López et al. 1998). The concerns of the Spanish population today are, as the MASIS country report points out, “in order of importance: unemployment, crisis, politicians, immigration, housing, terrorism, insecurity, social problems, education, environment/pollution and health. That is, Spanish citizens do not directly consider science itself as a cause for concern or debate” (Revuelta 2011, p. 9).

This notwithstanding, Spanish citizens have raised their voices and become active with respect to very concrete issues and projects “clearly following the ‘not-in-my-backyard’ syndrome” (Todt 1999, p. 212). Furthermore, the impression that there are no and have not been any political conflicts at all about technology would be wrong. GMO, stem cell research, and the phasing out of nuclear power plants as well as health issues such as the effects of electromagnetic fields are issues that arouse

public debate and mobilize energy (Revuelta 2011, pp. 11–15). Taking regional issues into account, further causes of citizen involvement include items such as the urban development of Barcelona, eucalyptus plantations in Asturias, and water management in Catalonia (Gómez et al. 2014, p. 459).

Recent changes in civil society and the political system in the direction of “monitory democracy” resulting from demands for responsiveness and accountability could mean a change provided that the new political parties and other organizations of civil society find that TA is a democratic innovation and a scrutinizing mechanism in line with their own intentions and ideas. To be fair, the signals we receive from this direction are, however, still rather weak.

With regard to the science system, we find a well-developed, although scattered landscape of research associated to TA (STS, innovation studies, policy studies, foresight, health technology assessment etc.). Interdisciplinary problem-oriented research, STS studies (cf. Gómez et al. 2014, pp. 458 et seqq.), research policy studies, and innovation studies are well established with roots that can be traced back to the 1980s. An early example was the report by a group with Manuel Castells for the Office of the Prime Minister on new technologies (cf. Sanz/Goicolea 1987, p. 19). Cuevas/López (2009) give an account of the research institutes established since the 1980s performing STS studies. In the 1990s, postgraduate studies related to STS were established in various universities, and “science, technology and society” has even become an elective school subject in high school since 1990 (ibid, p. 43). There are also some examples where STS was involved in tackling controversial public policy issues (see the examples in Gómez et al. 2014, p. 459). Nevertheless, the conclusions of the analysis by Cuevas/López (2009, pp. 46 et seqq.) will still be valid. They state that STS research in Spain is not yet sufficiently embedded in society and that its potential remains unleveraged. Challenges remain in the field of the public understanding of science, participation by civil society, and orientation for political decisions (cf. also Revuelta 2011).

What seems to be missing is a common focus on TA and the ambition to provide advice to policy-makers and to the public. Maybe the STS community with its international reputation, the Spanish Council for Scientific Research (CSIC) with the Institute of Innovation and Knowledge Management (INGENIO, a joint Institute of CSIC and the Polytechnic University of Valencia) and the Institute of Public Goods and Policies (IPP, the former Comparative Politics and Policy Unit) could become protagonists. Alternatively, associations (like COSCE, see above), academies (e.g., the Spanish Royal Academy of Sciences), or foundations such as FEYCIT (Spanish Foundation for Science and Technology) could assume this task.

A more comprehensive picture of the state of policy advice on science and technology matters

in Spain would have to include an analysis of those advisory bodies already in place that fulfill TA functions such as the Spanish Bioethics Committee, the Spanish Committee on the Ethics of Research, or the Subcommittee (154/7) of the Spanish Congress studying social networks (Subcomisión de Estudio sobre las Redes Sociales).

Case Study: Portugal

Economic and Political Background

Portugal experienced social, political, and economic changes during the twentieth century similar to those in Spain. Portuguese society suffered a long period of dictatorship under Salazar and Caetano, who maintained a political system comparable to the Franco regime. The colonial war since 1961, the obstacles to entering the Common Market (although belonging to NATO), censorship, strong emigration, and the absence of investments in its infrastructure and education system characterized the imbalanced social system and led to increased social tension and political unrest. Against this background, prodemocratic movements emerged and got stronger, eventually leading to the fall of the regime (carnation revolution) in April 1974. The new democratic regime freed political prisoners, reintroduced the freedom of speech and of political organization, and started a process of introducing democratic elections and establishing a new constitution. This transition process went through the election for the constitutional parliament (April 1975) and for the legislative parliament (April 1976). These two elections in the two consecutive years after the April 1974 *coup d'état*, enabled the establishment of a balanced executive-parliament relationship (cf. Leston-Bandeira 1999; Leston-Bandeira 2004; Freire et al. 2002). In parallel, the large national research institutes were reorganized, as was the university system.

Portugal became full member (together with Spain) of the European Economic Community – EEC – in 1986. From 1976 until this event, negotiations with the EC had taken place, the investment on science and technology (S&T) increased, and a renewal of the industrial infrastructure and support services was brought about. New programs targeting technological innovation stimulated the modernization of the country and eased the European integration. The S&T expenditures in relation to the GDP, however, were only 0.34 % in 1980 and 0.4 % in 1984, and most was spent in the public sector.

TA Initiatives in the Context of Changing R&D Policies

First initiatives related to scientific advice for science policy took place as early as the 1960s. To support the national budget services in preparing the economic plan, a special office had been established to carry out assessment studies and economic foresight studies.⁶ The most important innovation was probably the creation of the National Board of Scientific and Technological Research (JNICT) in 1967. The mission of this board was to plan, coordinate, and promote science and technology research and to advise the government on national science policy.

More profound interest in TA came up in the late 1980s within JNICT, which had meanwhile assumed new tasks targeting the development of the national science and technology system and sponsoring in particular large national laboratories. In the new democratic framework, JNICT also fomented the creation of a large scientific community and supported the emergence of research centers in new technology fields (computer sciences, astronomy, biotechnology, social sciences), trying to achieve targets the OECD had defined for Portugal.

Even then, there was already a TA-related community performing innovation studies. That community had emerged within the research fields of technological innovation and economic development. A national program (cofinanced by the EC's structural funds) to support innovation in the economic productive structures, e.g., industry, telecommunications, and logistics, made possible the research and publication of many studies on several cases, sectors, and regions.⁷ The research community of innovation studies was mainly an academic one.⁸ Internationalization of research in this area opened a space for members of this community to get in contact with TA experts from other countries. The seminal paper by João Caraça and Fernando Gonçalves entitled "Towards Technology Assessment in Portugal" was presented at a conference on Technology Assessment – An opportunity for Europe organized by the European Commission (EC) in Amsterdam in 1987. There, these authors stated that in Portugal "TA types of activities have been carried out largely through the public sector" (Gonçalves/Caraça 1987, p. 8). And by "public sector" the authors mean large institutes in fields like health, environmental and industrial engineering and public agencies. These authors have also been very relevant for the STS community in Portugal and supported the linkage between the universities and the national innovation system. In the early 1990s, João Caraça and António Moniz became the national members of the program committee of the 4th Framework Programme of the EC, when social sciences projects were organized in the TSER program (Targeted Socio-Economic Research).

The decade from 1990 to 2000 was characterized by a rapid development of S&T infrastructures and the transfer of innovations

from advanced research to the industrial and ICT sectors. On the EU level, Portuguese experts and social scientists were involved in that period in different EC DG XII initiatives on innovation and technology assessment, e.g., European Technology Assessment Network (ETAN), the MONITOR program, with subprograms like Forecasting and Assessment in Science and Technology (FAST), Strategic Analysis in Science and Technology (SAST), and Support of the Evaluation Activities of R&D Programmes (SPEAR). These initiatives were directly related to TA and were led by Jacques Delors. By then, Delors was President of the European Commission and had established a "Cellule de Prospective" which provided policy advice on innovation and foresight topics, and contributed to the design of research programs (cf. Endo 1994; Ross 1993). As the authors of the ERAWATCH report on Portugal underline, "the Portuguese research and development (R&D) situation changed rapidly in the second half of the 2000-2009 decade, with the GERD/GDP ratio peaking at a historical high of 1.64% in 2009" (Godinho/Simões 2014, online). The economic crisis from 2008 onwards put an end to the positive innovation system development. Despite the changes in the S&T system, R&D governance is still marked by a high degree of centralization, through fund allocation and political coordination. "The formal structures for hearing the main stakeholders have not been used often" (Godinho/Simões 2014, online). A slight change is the fact that the private sector invested significantly more on R&D in recent years (cf. Boavida/Moniz 2012).

It is also important to underline that there was one mixed commission at parliament involving experts and representatives of the public who debated the incineration technology issue (Matias 2008). This was probably the most important and therefore paradigmatic case in the late 1990s of such a mixed commission at parliament. Although unique in terms of parliamentary debate, it contributed to the awareness of risk issues and the need of independent scientific advice. In fact, risk, health, and environment issues have since then become an "emerging theme, both echoed and driven by the media, [which] reflects social concerns about decision making on matters of urban and rural land development, public health safeguards and environmental protection" (Alves 2011, p. 11). The mere involvement of experts, however, was not enough to fulfill the task of TA, as the Portuguese MASIS report suggests when it underlines that "visible differences between different scientists create a public perception of uncertainty and controversy, although these are intrinsic to science and scientific advice. This has particularly happened in the case of health issues (the recent H1N1 pandemic threat), environmental risks (the co-incineration government policy) and the management of land development (the implication of government decision on where to build the Lisbon airport or the third bridge over the Tagus)" (Alves 2011, p. 11).

In their report for ERAWATCH, the authors made the following statements: “a general criticism made of policy design and implementation in Portugal in recent years is the insufficient involvement of stakeholders in such processes. Formal mechanisms for participatory involvement have not been set up or have had a limited practical role. Furthermore, the lack of a sound public opinion basis and of stakeholder consultation significantly hinders the accumulation of consistency in learning and policy. Research policy is no exception to this state of affairs.” (Godinho/Simões 2014, online)

Furthermore, the lack of relations between the national S&T system and economic structures is a marked weakness of the Portuguese innovation system (Henriques 2013, p. 270; Laranja 2012, p. 660). The academic side, regarding itself as the primary source of innovation (e.g., academia, national laboratories, larger research institutes) does not see its duty of innovation transfer, and the industrial side, with almost no tradition of joint projects, is presuming that academics are developing technologies not suited to their needs and the demands of the national economy (Moniz 2012a, p. 185). As a matter of fact, there is almost no dialogue. But there is also a weak relation between these structures (S&T and industry) and the policy governance. The Portuguese PACITA country report mentions that “the relatively limited interaction among different ministries results in science policy being potentially inward-looking rather than aimed at supporting the overall advance of the society, both in terms of innovation and relative to broader issues” (Almeida 2013, p. 8).

Current Opportunities and Steps Towards the Institutionalization of TA

The PhD program on “Technology Assessment”

There is a very small STS community in Portugal, but a very large one on innovation studies (mostly economists). The *PhD program on Technology Assessment* is providing competence in both fields. It is the only one that offers a degree in TA. This program was proposed by the Universidade Nova de Lisboa (UNL) and started in 2009/2010, aiming to prepare highly skilled researchers and decision-making consultants who will be involved in the policy processes for technology options, which are expected to become critical in the short and medium term. The proposal was made by social scientists at the Faculty of Sciences and Technology of that university (UNL), but natural scientists and engineers were also associated (Moniz 2012b). A recent study on TA education in Portugal mentioned that “one can say that in Portugal, TA is still without critical mass of researchers, although its political importance is growing very fast and the expectations towards TA seem clearly expressed” (Moniz/Grunwald 2009, p. 20). The TA community is already

involved in the reconstruction of the national innovation system (NIS), and it is prepared to advise on policy making. Most researchers are already involved in the larger R&D centers and laboratories (CES, CIES, CESNOVA, INSA, ITQB), participate in several national and international research projects, and have been involved in policy advice studies provided by those centers to several ministries in the field of innovation and science policies.

There are around 20 research projects under development, and the first group of theses on TA was presented for public discussion in the frame of the PhD program on TA at Universidade Nova de Lisboa (UNL) in 2011. Until 2009 (when the PhD program started) there were still few researchers in this field. Five years later one can already talk about a “critical mass” of TA researchers. Almost 40 candidates were enrolled in this advanced level of studies. The knowledge fields in the program cover topics from health TA studies, towards mobility and transport, brain-computer interfaces, innovation and STS, and cloud computing (Baumann 2013; Boavida 2011; Maia 2011, Velloso 2012).

The National TA network GrEAT

The *national TA network GrEAT* was launched by the group of experts connected with the PhD program on TA. This group established regular contacts with other STS experts in Portugal and with the parliament. The scientific events of the PhD program were also disseminated through this network, and the topics discussed there were not exclusive to the academic sphere. In fact, there are several problem-oriented research projects ongoing. This interdisciplinary “research community” is offering its advice through GrEAT and demanding a TA-type interface between parliament and science.

Parliament is playing a strong role in public life, although it remains weak when dealing with S&T issues. There is a lack of S&T competence among the MPs, and this goes together with little interest in these matters. The younger generation of MPs seems to be more engaged and interested. Attempts have been made by parliamentary entrepreneurs from different party groups to support TA since 2010. These people, who include J. Ribeiro e Castro, Gabriela Canavilhas, António J. Seguro, Rui P. Duarte, Luis Fazenda, Isilda Aguincha, and Rita Rato, also strive for PTA. In recent years parliament has approved the intention to establish a TA unit.⁹ The Parliamentary Committee on Education, Science, and Culture (CECC) is the one that has been in charge of the organization of a possible TA unit at parliament since 2012.

This committee was contacted by the Portuguese PACITA partner Mara Almeida, and in April 2012 she presented a report where such a unit was proposed (Audição Parlamentar N° 47-CECC-XII). On February 6, 2012, the committee approved the report and nominated

a rapporteur for parliamentary technology assessment (Rui Santos). The national TA network GrEAT was not involved in this activity. By July 12, 2012, the management board of parliament determined that such unit would not receive financial support from the parliament itself for two possible reasons: because of a lack of financial resources in the context of austerity or because there were no precedents for the type of unit proposed within the organizational structure of parliament. This blocked the process at least temporarily. Meanwhile GrEAT became involved, aiming to help breaking the deadlock.

The first contacts of GrEAT with different party groups at parliament started in early 2010 (in January with meetings with MPs and European TA experts). Later, several MPs representing the spectrum of political parties in parliament also took part in conferences organized together with the PhD program on TA or participated in initiatives of the PACITA project in Portugal. Although these activities were running in parallel, some sort of synergy was missing between the national TA network and the PACITA project. The most support was received from ITAS, which hosted several PhD students and sent experts to participate in the PhD program events. Since 2010 GrEAT has established four permanent working groups¹⁰ and published the results of several research projects. The most important deliverable of GrEAT has been the *Tópicos* leaflets presenting research results envisaging communication with the wider public. Ten *Tópicos*¹¹ have been published so far and sent to parliament and other governance institutions.

In 2013 GrEAT was accepted as an EPTA observer institution. In its current work, this national TA network is taking part in the organization of public events that are part of the PhD program on TA, is providing information about OTA, EPTA, and STOA studies,¹² and has proposed the creation of a virtual library on TA at parliament, which could be managed by parliament's Technical Information unit under collaboration with GrEAT.

Furthermore it supports the preparation of options regarding how to establish a parliamentary TA unit in Portugal. During 2014, a series of hearings was held on the organization of a TA unit and PTA functions in general, organized by the above-mentioned parliamentary committee – CECC.¹³ Several proposals are currently (December 2014) under discussion in parliament. Moreover, GrEAT is working to overcome the hurdles at parliament that blocked the emergence of a TA unit.

Besides the involvement of GrEAT at the level of the national parliament, contacts have been made with the Azorean Regional Parliament that may lead to further advice on PTA in the regional parliament. Issues on energy and sustainability are of major interest in the autonomous region.

In conclusion, TA activities in Portugal are grounded in international cooperation and

in expanding scientific expertise through the PhD program at the UNL (in cooperation with ITAS-KIT). The PACITA project organized two national workshops in Portugal (2012), the second parliamentary debate on “*Strengthening Technology Assessment for Policy-Making*” (April 7–8, 2014) in the Portuguese Parliament, the first PACITA practitioners meeting on “Selecting the theme” (September 19–21, 2012 in Lisbon), and a policy hearing involving the Future Panel on Public Health Genomics (Lisbon, January 18, 2014). Both streams of activities increased the opportunities for establishing parliamentary TA in Portugal.

Conclusion: Two Countries Ready for Good Old TA

The institutional structure of the science, technology and innovation policy field offers different potential “docking stations” for TA in Spain as well as in Portugal. At present, one promising option in Spain is to attach TA capacities to the Advisory Council for Science, Technology and Innovation. This way, TA could serve Parliament and the Executive – or in other terms: all parties. In Portugal the option to attach TA capacities to the Parliamentary Committee on Education, Science and Culture currently appears as the most promising one.

The case of the successful institutionalization of TA at the Catalan regional Parliament in 2008 has shown the importance of the scientific community being committed to TA and building up pressure on the parliamentary system. At the national level, the intention and offer of COSCE to deliver TA to the Parliament has not reached its aim. It needs to be emphasized that TA is not the voice of science, but a type of scientific analysis taking into account multiple perspectives, unintended side effects, and systemic effects of sociotechnical dynamics able to come up eventually with sound options for politics. Maybe a common effort of those scientific communities in Spain that are particularly relevant to delivering TA (e.g., innovation studies, STS studies, policy and governance studies, sustainability research) would be worth another try. In the case of Portugal, we see the GrEAT network as an attempt of the members of the relevant scientific communities to demonstrate that there are TA capacities on which to rely when institutionalizing PTA.

In Spain there were several failed attempts to establish TA at the central state level before the most developed region in economic terms, Catalonia, took the lead. In Portugal the current activities at the national parliament have raised awareness of the potential of TA at the regional parliaments in the Azores and Madeira (in particular the Azores). If the institutionalization at the central state level does not succeed, it may well be that we will see TA at the regional level first. However, the significance of the Azores and Madeira for the Portuguese innovation system is limited.

It has to be further stressed that the European context has been of great importance for the institutionalization of PTA in European countries from the beginning. The introduction of democratic innovations often goes together with a close look at foreign experiences and best practices abroad. Exchanging ideas and learning from the experiences of others require common projects and community building. For national TA communities (in a broad sense) it is important to be involved in European research projects like ETAN, TAMI, EUROPTA, and PACITA and in international community building activities, namely EPTA. While CAPCIT is a member of EPTA, and GrEAT has the status of observer at EPTA, there is no institution or network representing the overall Spanish TA community. International projects and networks in this field in which Portugal and Spain participate are also important vehicles for raising both the attractiveness of TA research in these countries and the awareness of politicians for TA as an instance of democratic innovation.

The perspective of “monitory democracy” should allow politicians to see TA as a democratic innovation to support decision making, but also as a policy-scrutinizing mechanisms, able to increase accountability and responsiveness of the political system regarding its innovation and environmental policies. This might be particularly appealing in countries where civil society puts pressure on the political system to introduce innovations in terms of participation, accountability, and responsiveness. Comparing the protest movements which emerged during the economic crisis and the activities they have brought about, steps towards a monitory democracy are more apparent in Spain, although there are also social movements in Portugal demanding a change in innovation policy with regard to controversial technologies. A proper understanding of monitory democracy has to take into account that citizens’ demands for participation do not always have to be translated into a demand for direct participation in decision making. As explained above, political innovations putting forward transparency, accountability and control are an important aspect of a monitory democracy. “Good old TA” can fulfill its purpose in these circumstances as long as its results are open for public debate and as long as the resonance from the study results can be traced in political debates. Once this type of TA has been established and has proved worthwhile, the demand from civil society and politics will indicate how far new forms of participatory TA are additionally required.

Notes

- 1) We agree with most of the conceptual framing of PTA as presented in Ganzevles/van Est (2012, pp. 18–27; pp. 184–220). A difference is, however, that we stress the importance of the public sphere and the embedding of TA and PTA in the context of changes in Western representative democracies, especially with regard to new scrutinizing mechanisms.

- 2) This view is confirmed by recent research about parliaments as communication space (cf. Schulz/Wirsching 2012, pp. 12–15; Patzelt 2012, p. 45).
- 3) Not to forget, however, the terrorism of the Basque ETA separatists and a failed coup d’état in 1981 led by Antonio Tejero – 23-F.
- 4) We won’t go further into the criticism of the current government’s policy in this field (inter alia: linear understanding of innovation processes, delays in the constitution of a Spanish Research Agency, funds not provided for “grand-challenge research”, dismissal of scientific personnel, brain drain).
- 5) It is no exception that an innovation can be attached to one or the other institution depending on the forces in a political system. E-petitions in Great Britain for instance, again a democratic innovation, were introduced first as a service of the Scottish Parliament, and then at the state level as a service of the Prime minister (cf. Riehm et al. 2014).
- 6) GEBEI – Portuguese Office for Basic Studies on Industrial Economy, Ministry of Finance and Planning.
- 7) The PEDIP program to support innovation in industry mobilized a wide capacity for assessment studies and services oriented towards application of new and emergent technologies in the productive sector and support services, as new forms of consulting competence for technology evaluation. This governmental program had the financial support of the European structural funds and was started in 1988 (Council Regulation No 2053/88 of June 24, 1988). It lasted until 1996.
- 8) Mainly from the Institute for Economics and Management (Technical University of Lisbon), the Social Studies Centre (University of Coimbra), Faculty of Economics of University of Porto, Faculty of Sciences and Technology (University Nova Lisbon).
- 9) Resolution of the Portuguese parliament number 60/2009 of July 10, 2009.
- 10) WG 1 – Health Technology Assessment; WG 2 – Indicators of TA; WG 3 – Transport and Mobility; WG 4 – Foresight Analysis
- 11) <https://avaliacaotecnologia.wordpress.com/topicos/>
- 12) <https://avaliacaotecnologia.wordpress.com/publicacoes/publicacoes-do-great/#>

- 13) The hearing with representatives of the national TA network (Audição Parlamentar N° 162-CECC-XII) is available at <http://www.parlamento.pt/ActividadeParlamentar/Paginas/DetalheAudicao.aspx?BID=97045>. Besides the MP that belongs to the parliamentary committee – CECC, the present members include GrEAT (e.g., A. Moniz and L. Vasconcelos), J. Caraça (from the Gulbenkian Foundation), V.C. Simões (Portuguese report coordinator of ERAWatch), M. Almeida (Portuguese partner of PACITA project), and M. Heitor (former secretary of state of Science). All of these hearings are available at the parliament webpage.

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Is There a Chance for TA?

Reflections on the Perspectives for TA in Eastern/Central Europe

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Technology assessment has been widely unknown in many Central and Eastern European countries until now. This paper is a reflection about the possible roles and potential of TA in some of these countries (Bulgaria, The Czech Republic, Hungary, and Lithuania) based on discussions as well as the activities in the course of the PACITA project. The article views the current situation against the background of the historical heritage such as the Soviet Regime as well as compares the specific political culture and climate of these countries with those in some of the Western European countries in which technology assessment units were introduced in the 1970s and 1980s. So far, TA is only regarded as an unrecognized need by many in Eastern and Central Europe: often a lack of understanding of the TA concept by decision makers, the inflexibility of the current system, the danger of a politicization of such attempts, the concentration of decisions in the government rather than parliament as well as problems with financing and a lack of TA-trained human resources are named as reasons for this state of affairs. For the future, two perspectives are proposed: First to focus on the important role of the EU with regard to its financial power as well as the mutual learning occurring across national contexts. Second, a transition strategy for TA in these countries should be elaborated to support the national TA initiatives which have started in the meantime. Different roles for TA are proposed here which rely on national activities but also on an international TA network accompanying the future development of TA in these countries.

Introduction

Technology assessment (TA) and parliamentary technology assessment (PTA) are still new concepts in most of the Central and Eastern European countries – although first efforts have already been made in some countries, e.g., the participation in EU-funded TA projects or experience with TA-related activities such as technology foresight. The EU-funded project PACITA (Parliaments and Civil Society in Technology Assessment) tried to explore the main barriers to and opportunities for TA in several European countries with the aim of expanding the current TA landscape to Central and Eastern Europe. The present paper provides an “outsider’s” look, namely by a PACITA project partner who was introduced to the concept of TA for the first time by the PACITA project. The reflections presented in the following pages are based on the learning process the author underwent in the course of PACITA, i.e., discussions on the TA concept with colleagues from established (Western) TA institutions, the outcomes of the TA activities within the PACITA project, discussions with his “fellow non-PTA” colleagues, and last but not least the impressions and insights gained from the author’s efforts to initiate a TA debate among researchers, policy makers, and civil society organizations in Lithuania.

From this perspective it appears that for the Central and Eastern European countries involved in PACITA (Czech Republic, Bulgaria, Hungary, Lithuania) the findings of the project suggest that there are much stronger obstacles to the introduction of TA as a concept of independent and public policy advice than can be overcome by just transferring knowledge on methodologies and concepts from “PTA” to “non-PTA” countries. These obstacles are rooted to a great part in the remnants of influence of the former Soviet system on research and innovation and in the current struggles to reform the R&D system, especially in the context of the financial crisis. Melnikas et al. (2011) state that in Central and Eastern Europe the main barriers to starting political innovations and to strengthening the role of civil society in the democratic system lie in the fact that most of these countries try to adopt the Western model of democracy in the hostile environment set up under the influence of the former Soviet Union.

An Unfavorable Environment for TA: Old Structures Struggling with New Problems

Is there a real chance to establish TA in the Central and Eastern European countries? This is the first question I raise with a view to the history of TA and to the arguments prevalent in the process of establishing TA in European countries during the 1970s and 1980s. Hennen and Nierling (2014) have narrowed down factors for the establishment of TA in “old” countries to four main factors: (a) highly developed, differentiated, and governmentally supported

R&D system; (b) problem-oriented research and self-reflective science in the academic sector; (c) critical public interest in issues from science and technology (S&T); and (d) strong and explicit demand from policy makers for scientific knowledge and methods to deal with public concerns.

For the first two factors – a highly developed and Government-supported R&D system and problem-oriented research in the academic sector – the situation in the Central and Eastern European countries nowadays differs quite clearly from that in Western TA history. While Hungary and the Czech Republic have some experience in TA-like activities (especially in technological foresight), Lithuania and Bulgaria are just making their first transitional steps towards problem-oriented and interdisciplinary research. In Lithuania, problem-oriented research is strongly supported by the government in the field of research and innovation policy. This often relies, however, on the consultancy work done by private companies and, furthermore, is usually initiated by measures of the European Union or the OECD (Technopolis group 2013; Valinius 2013; Reid et al. 2012).¹

In the current situation, the R&D system in Central and Eastern European countries is in need of huge investments into infrastructure. R&D policies respond to this demand and are aimed at supporting investments through various “catching up strategies,” often financed by European funds like the science and business cooperation “valleys” programs in Lithuania (LMES 2014), the National Research Infrastructure Survey and Roadmap in Hungary (HNIO 2014), or the National Development Program Bulgaria 2020 (BMOF 2014).

As those countries do not have much experience in investing into big R&D infrastructure projects, the effectiveness of such investments is low, the return on investments is unknown, and their future is uncertain. With a view to worldwide trends, Central and Eastern European countries try to catch up with innovation, thus competing with each other in similar areas (nanotechnology, biotechnology, information and communication technologies, renewable energy, etc.) without having real capacities to establish themselves as strong players in these fields of technology. This reveals the gap in strategic technological priorities between Western and Eastern European countries: Western countries rely on already existing technologies, practices, institutes, research, and businesses. Central and Eastern countries are often victims of wishful thinking by their politicians and still need to find their way to differentiate themselves from other countries and to stay competitive on the European or global “playing field”.

On a general level, public interest in S&T in most European countries is low, with an average of 40 % of respondents interested in S&T (EC

2013). In the Central and Eastern European countries analyzed here, the figures are even below the European average (see table 1):

Table 1: Public interest towards S&T in Central and Eastern European countries analyzed

Country	% of people interested in science and technology issues
EU	40 %
Lithuania	33 %
Czech Republic	29 %
Bulgaria	25 %
Hungary	25 %

Source: EC 2013, p. 9

However, recent case studies in the named countries have shown that public debates on some controversial issues can become lively and even hot, leading to strong disagreements with official positions of the government. However, such debates are too often the object of changing political tactics and strategies and do not lead to the consistent political uptake of arguments and positions. The Lithuanian debate on building a nuclear power plant (Leichteris/Stumbrys 2012) can serve as an example here. The fatal accident in the Chernobyl nuclear power plant in 1986 initiated a public debate about the security of the Lithuanian nuclear power plant, which was equipped with a Chernobyl type of reactor. The debate started around “technological” issues but soon developed into a fight for Lithuanian independence because the green movement became a hidden organizational force for much broader civil action. Soon after Lithuania became independent, the “technological issue” became “economical and political”: from 2005 to 2012 the Government showed very clear support for the development of a nuclear energy system in Lithuania. Under the pressure from the EU, the old-type Chernobyl power plant was closed, but negotiations to build a new one were started. The public did not follow the negotiations and was disinterested in the decisions until the Fukushima nuclear disaster in 2011. Since one of the main potential builders of a new power plant was the Japanese company Hitachi, the accident in Japan revived the debates over nuclear energy in Lithuania. In a public referendum in 2012, the wave of public disagreement voted against building an nuclear power plant. In Austria during the late 1970s a similar plebiscite triggered a debate over a systematic analysis of technological policies (Nentwich et al. 2012). In Lithuania this was not the case. The political party which agitated the most against nuclear energy later formed the government and now faces a dilemma. On the one hand, there is a clear necessity to have an independent energy system. It is supported by the fear of political influence exerted by Russia (especially in the light of recent Russian military actions in the Ukraine). On the other hand, the main potential strategic partners – Latvia, Poland, and Estonia – have expressed concerns about acting against public opinion. At the moment the arguments in

favor of building a nuclear power plant seem to be stronger than the technological controversies over nuclear energy, and connected with this the reluctance to go against public opinion is vanishing. However, the government has now gone for two years without making any decision.

When reflecting on the explicit demand by policy makers for scientific knowledge and methods to deal with public concerns, factors very well-known from Western European countries also apply to the new democracies in Eastern and Central Europe. In general, politicians are action oriented and need to solve problems as quickly as possible, and their search for knowledge for doing is not for the sake of knowing itself (Bimber 1996). In the Lithuanian context, it is difficult to involve them in activities which are not relevant for their current political agenda or are not being widely debated in the public sphere. And if they are involved, they tend to take shortcuts by using weak evidence, referring to selected experts' opinions, or making their own subjective decisions without having the relevant knowledge. Eastern and Central European policy making, moreover, suffers from traditions which add additional obstacles to the utilization of independent policy advice and transparent deliberation on S&T issues. In both Western and Eastern European countries there is a wide use of experts whose role is to give independent advice on S&T issues and fuel scientific knowledge into policy making. But how those experts are chosen and how their "objectivity" is supported throughout the whole process differs in the Western and Eastern traditions. In Western European countries experts are usually involved by policy makers to legitimize an argument by providing scientific authority. The Eastern tradition of scientific policy consulting was born under the influence of the Soviet political system, where science for a long time served as an instrument supporting political propaganda (i.e., the scientists were not consulted for their expertise, but were ordered to create evidence supporting the Soviet political regime).

This makes science-based policy advice an area that is also regarded with distrust by the general public in Central and Eastern European countries. Whereas the problem in the Western European countries might be the contradictory nature of advice given by different types or groups of experts (expert dilemma), in Central and Eastern European countries it is a general distrust in the independence of scientific advice. On the one hand, independent expertise is desperately needed and demanded, while on the other hand transparent procedures of selecting experts and open processes of policy consulting are lacking. Such structures of democratic processing of scientific knowledge are difficult to establish in a political culture that is still molded by the old system of instrumentalizing science and scientists.

An active civil society embedded in a culture of transparent and open policy making is far from being well developed in the countries under consideration here. According to Transparency International (2014), the "non-PTA" Central

and Eastern European countries involved in PACITA (Lithuania, Hungary, Czech Republic, Bulgaria) show a middle level of corruption (scoring from 40–59), while their PTA "twinning partners" in the Western European countries show very low (Denmark, Norway, Switzerland, The Netherlands) or low (Germany, Austria) levels of corruption (scoring from 69–91). In addition, Lithuania struggles with very low levels of civic participation (PVI 2014). Bulgaria's development of a democratic culture suffers from the dominance of politically and governmentally owned NGOs (CSD 2010). Hungary recently started imposing more controls on NGOs and the free media. Therefore it is not only about making policy makers aware of their need to cooperate with scientific experts but also about creating awareness of the need to ensure there are clear, transparent procedures of expert selection. The debates, conflicts, and networks needed for the introduction of TA as a means of achieving public accountability of policy making might themselves function as a good exercise helping these countries to impose bigger changes with regard to structures that allow for public deliberation as a basis for democratic decision making.

Thus, even if Central and Eastern European countries are heading towards institutionalizing TA, there are still big challenges to solve. How can an institution or network of institutions be created which is capable of providing high quality, valid, and credible evidence to policy makers? Representatives of Central and Eastern European countries are often afraid that the process of institutionalization of TA can be undermined by politicians and that, as a consequence, TA can lose its main features – namely objectivity, impartiality and independence – or can be taken over by formal organizations lacking competence on TA.

Starting a TA Debate in Lithuania: An Unrecognized Need for TA?

Reflected against what I have learned from guiding a process of introducing the TA concept to relevant actors in Lithuania and according to what I have observed from respective processes in other countries in the course of the PACITA project, there is little evidence that the environment in these countries is as favorable for the institutionalization of TA as it was in other European countries during the 1970s and 1980s.

Evidence from the "old PTA countries" (Ganzevles/van Est 2012; Mintrom 1997; Cruz-Castro/Sanz-Menéndez 2005) shows, that even with a favorable environment most institutions needed "political momentum" and "political entrepreneurs", which currently are not very likely to enter the scene of S&T policy making soon due to the above mentioned problems. And even when they are in place, the road of institutionalization is full of long battles and attempts to gain political influence over the TA institution. By now, we can at best identify what has been coined an "unrecognized need" for TA

in interviews in Lithuania (Leichteris/Stumbrys 2012, p. 203). In the course of the interviews and workshops on TA that have been organized in Lithuania, the debate constantly circled around making the TA concept understandable to politicians and other actors and communicating the usefulness of TA products. Although many of the TA discussants in Lithuania were in favor of independent policy advice and transparent structures of deliberation (as a remedy for the blockades caused by “old thinking” and “old structures”), they could hardly imagine that such initiatives would be prompted by politicians. In turn, the interviewed politicians were rather skeptical about the Lithuanian parliament as a seedbed for evidence-based policy making and expressed disbelief of the effectiveness of a TA unit if it would have been created in the parliament due to its weak role in S&T policy making. Rather, an institution under the government or an independent institution was mentioned as offering a more favorable option, provided that it will be able to concentrate competence from different areas and will be funded accordingly, thus overcoming the problem of capacities scattered across several institutions and authorities.

In Lithuania, it seemed that consensus was reached regarding how to solve these shortcomings by using an innovative TA institutionalization model: This network model of open cooperation among different institutions was supported by NGOs, consultative agencies of the government, and the Lithuanian Academy of Sciences. Later however that model was indirectly opposed by the Lithuanian Science Academy.

The Lithuanian Science Academy followed the model of a Soviet Science Academy for more than 40 years. Although it was formally reformed after independence, the culture, people, traditions, and procedures remained the same. The soviet tradition was based on the imperial Russian model, created in the XVIII century, which unlike its Western counterparts (which acted as institutions of scientific research) was given numerous powers of supervision and control (Vucinich 1956). These powers were even further strengthened during the Soviet period, supported by the utopian vision of a world domination in science and by a centralized system of financing and control instead of methods based on scientific peer reviews and research grants (Graham 1993). When new players emerge in the field (be they private institutes or NGOs, claiming the potential for offering science-based evidence to politicians), a confrontational situation comes to the fore: the old players want to keep their monopoly in providing policy advice and are reluctant to open the system to the public.²

The recently discussed draft of the Law on Science and Education now foresees assigning an exclusive, higher advisory role to the Lithuanian Science Academy and the Lithuanian Research Council. According to the proposed changes in the current draft of the law, the Lithuanian

Science Academy might be given expert functions for all strategic questions on science and education, whereas the Research council might get the function to evaluate R&D activities. This development does not close the door to the use of the network model, or to having other institutions perform TA in Lithuania, but it might also constitute some additional formal roadblocks. However it may also open the opportunity to have a strong network, based on trust and cooperation, which is capable of identifying policy options, has clear channels, and is assigned a mandate in the law with regard to how to push things forward on the political agenda.

As Smits et al. (1995) point out the most important attributes of TA are quality, validity, and credibility. Bimber (1996) and Rodemayer et al. (2005) state its “neutral competence”, namely the ability to provide unbiased and balanced policy advice. Such features are not created simply by putting them into the law or other regulations. They need to have a favorable political environment, they are harvested slowly during the lifetime of an institution whose sustainability comes from the constant cooperation between different actors.

All in all, the main obstacles to establishing TA in the countries under consideration here are a lack of expertise and understanding of the TA concept by parliamentarians, the inflexibility of the current system that hinders the establishment of new institutional structures, the usual “politicization” of such attempts, the concentration of decisions in the government rather than parliament, the financing issue, and the lack of TA-trained human resources.

Europe as a Factor to Keep the TA Process Going

If most of the factors which worked for the “old” countries are not in place for the establishment of TA in Central and Eastern Europe, is it possible to identify new factors which can help institutionalize TA in these countries in a mid-term perspective?

A first, strong factor can probably be attributed to the general European policy and its financing instruments – namely Europe’s Horizon 2020 strategy (Horizon 2020 2014) as well as the strategy of smart specialization as a tool for R&D and innovation based on regional growth (McCann/Ortega-Argilés 2013; Wintjes/Hollanders 2011). EU funding given through Horizon 2020 can create synergies with national programs by pushing important issues from the European to the national political agenda which are otherwise not discussed at the national level because of a lack of information or local knowledge. However, the participation of the new member states in EU policy making – especially in the areas connected to science, technology, and innovation – is very weak. Often, they even do not have the capacity to analyze their own R&D and innovation potential and to induce policy

actions to improve their competitiveness on their own. In response to this situation, the European Commission started the smart specialization strategy tying the financing from the European Structural Funds to the ability to identify smart specialization priorities. Although TA and smart specialization cannot be easily compared, the debates in the Central and Eastern countries show that TA is often tightly connected to innovation policy (Bulgaria, Czech Republic, Lithuania) and less often with research policy (Hungary). Thus, the smart specialization processes can provide sustainable amounts of money to implement technology-based innovation programs. Further, transparent, well organized and evidence-based debates over smart specialization priorities can clear the road for further debates on the opportunities and risks of specific technologies and innovation paths. The Knowledge Economy Forum, a not for profit organization in Lithuania uniting business companies, research institutes and policy experts and a partner in the PACITA project, was involved in debates on smart specialization priorities from the very beginning and is now planning to initiate a further debate with parliamentarians over the technologies behind those priorities. In the Czech Republic, the Technology Center ASCR (also a PACITA partner) acts as a technology transfer office and can also be one of the implementing bodies for smart specialization strategies. The strong orientation of S&T policy to induce innovation strategies can be used as an entry point for TA to bring in strategic knowledge and help organize a discourse on feasible and sustainable national technology priorities.

A second factor supporting national reflections on TA is the mutual learning induced by European cooperation and exchange. Although many of the experts involved in the national PACITA activities were skeptical about the possibilities to induce institutional structures of knowledge-based policy making, there was a great eagerness to learn about TA methods, to understand developments in other countries, and to initiate transdisciplinary research projects. This is demonstrated by the very large number of participants and their feedback given in practitioner training workshops and summer schools of the PACITA project. The project created a strong network of a wider European TA community, including related infrastructures such as the European TA portal.³

On the one hand, the partners from Central and Eastern Europe contributed to this network by offering their specific perspective to the international TA discourse. On the other hand, they formed a separate unit where they shared problems and experiences from recent developments in S&T policy making and discussed main obstacles and opportunities for establishing TA.

There is some risk that such cooperation will diminish with the end of the PACITA project in the future. These partners are therefore now eagerly looking for opportunities to continue the cooperation in this wider TA network, e.g., by participation in further TA-related EU-funded projects.

An Incremental Way Forward: A Transitional Function for TA

Discussions on ways to achieve an institutionalization of TA in Central and Eastern European countries revealed different strategies depending on each political context. When there is already some “research based TA” experience available, such as from strong links with the respective science academy, these activities can naturally serve as a starting point: Colleagues from the Czech Republic and Hungary are inclined to follow that approach. In other countries even the rudimentary practice of TA has to be built up from scratch; in this case, civil society organizations may take the lead. The discussions triggered by PACITA in Lithuania and Bulgaria led to the first steps towards a network-based model characterized by awareness-raising campaigns, proactive approaches by potential candidates for institutionalization, and strong cooperation with national cross-disciplinary organizations like think tanks, analytic centers, and policy institutions (Kozarev 2012; Leichteris/Stumbrys 2012).

All in all, it appears to be premature for Central and Eastern European countries to simply start discussing different organizational models of TA, be they connected to parliament or government (see van Est et al. in this volume). Thus a pragmatic approach is proposed here: Instead of trying to persuade the parliament or government to establish a TA unit or to foresee a yearly budget and long-term responsibilities, a potential TA “seed bed” institution should concentrate on finding its “first client,” be it parliament, the government, a ministry, the Science Academy or even individual politicians. It should start to establish contractual or personal relationships to other organizations, try to deliver high-quality TA products, and showcase their value. The model of implementation that the countries choose is much less important than the transition strategy they develop. Part of such a strategy might be the definition of temporary functions which can be performed in the specific national context and can thus provide a solid basis to institutionalize TA in the future.

Such a transitional strategy of TA can include the following roles:

- a) TA as a “content marketer” “selling” science-based evidence,
- b) TA as an “eyes opener” of future options,
- c) TA as a “lobby organization” to establish knowledge-based decision making,
- d) TA as a “knowledge sharer” in an international knowledge exchange network.

TA as a *content marketer* takes into account the existing barriers to establishing a transparent knowledge-based process of advising policy making. It nevertheless tries constantly to feed in knowledge as well as to offer procedures for an open and transparent discourse to policy making within the limits of the available financial and human resources. It can aim at training measures to create TA awareness in policy making by giving profound explanations on policy choices and on the benefits and constraints of debated technologies. It can target the issues which are on the current political agendas. The function will also have its own challenges: It can imply a constant pushing of relevant information to politicians, analyzing why evidence was either not used or was rejected, and then test the process again with other methods or modified content. This function might be called a “stealth” approach where TA methods are used to give evidence on decisions which are already on a short-term political agenda, while postponing the direct promotion of institutionalization of TA. Content marketing should concentrate on the delivery of high-quality content and thus prepare the ground for an institutionalization initiative by “making advocates” for TA.

TA as an *eyes opener* shall give politicians a glimpse of what is going on at the EU level or in other European countries and will raise awareness of important issues. TA can be understood as a broad set of practices aimed at informing, shaping, and prioritizing technology policies and innovation strategies by deliberately appraising in advance their wider social, environmental, and economic implications (Ely et al. 2014). That means that TA is a forward looking tool. During the transition period, new countries can concentrate their efforts on pushing some questions which are not seen as being relevant in national parliaments but which are eagerly debated in parliaments of other countries. It should not be overused or lead to the provision of complex research. It should be oriented more to the dissemination of already existing and widely available knowledge beyond a national context.

TA as a *lobby organization* shall aim at building up a coalition of TA practitioners, policy consultants, and research institutes. It does not defend particular interests, but puts issues with medium-term importance on the political agenda that have so far not been taken up. Taking input from the European Agenda as well as support with regard to existing studies and research from a European network will be crucial. Networking shall be used intensively to make personal relationships with policy makers and to form a generally positive public opinion toward evidence-based policy making. If the resources allow for it, policy evaluations can be performed, showing the shortcomings of current policies and providing general recommendations for action.

TA as a *knowledge sharer* shall concentrate on cross-border European exchange. There will always be a constant need for various examples

of how one or another issue is solved in other countries. If Germany, Austria, The Netherlands, or some other TA countries can afford large-scale research on the impact of technologies developed in their countries on society in general, a more feasible solution in the case of Central and Eastern countries – given their budgetary constraints and undeveloped R&D systems – is to adapt knowledge that already exists in the EU to the local context. Thus, the cross-European cooperation of TA-like institutions, the exchange of information on parliamentary TA issues, and the sharing of research results among TA institutions is important.

All of these transitional functions and roles clearly require an actor or a group of actors equipped with a minimum of institutional support to take up this role. In this respect the discussions and debates initiated by the PACITA project in the Central and Eastern European countries have provided at least the ground for follow-up activities in the above-mentioned sense. Groups connected to the analysis of R&D policy in the Academies of Sciences as now visible in the Czech Republic and Hungary show a growing interest in TA. They may be able to take over this role for a period of time even without stronger support from policy makers. The role can also be taken over by single NGOs or a network of actors interested in TA as was proposed for Bulgaria and Lithuania. In the long term, all these activities will hopefully contribute to the establishment of national coalitions of TA supporters, including national research institutes, NGOs, and business associations. The integration of such actors in a European network seems to be crucial to make initiatives sustainable, not the least by including more national actors in EU-funded TA-related research.

Notes

- 1) Nearly all initiatives in problem-oriented research for policy consulting are managed by the Ministry of Education and Science of Lithuania and their analytical center MOSTA. However, despite its high ambitions, there is still a missing link between science and the societal and political uptake of scientific knowledge. One interesting example was the preparation of a foresight action called “Learning Lithuania 2030” (MOSTA 2011). The action struggled hard with the transformation of its results into policy making, but ultimately the results were not reflected in the corresponding policy documents. Further, there are some activities to popularize science in society: Some are led by the Lithuanian Academy of Sciences, which coordinates a consortium of universities. Others are more informally organized as “science popularization networks” consisting of NGOs, youth organizations, and others.
- 2) The recent organizational evaluation of the Research Council of Lithuania (RCL) renewed the interest of this institution in

policy making. One of the main findings of the evaluation's report stated that: "The RCL has a dual role as a funding agency and as a provider of policy advice, but the former dominates the latter and that results in the underutilization of a valuable voice within the national system" (Feely et al. 2014, p. 6; further pp. 20–21). Thus, the RCL might become another important player in science-based policy advice.

3) <http://technology-assessment.info/>

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Technology Assessment in the USA: Distributed Institutional Governance

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In the US, there is a lack of a centralized technology assessment (TA) capacity, which effectively moves the US back in time, pre-Office of Technology Assessment, when TA functions existed but were so decentralized and varied that they were hardly recognized as such. There is no primary organization, public or private, to innovate new methods, establish best practices, or provide policy guidance. Instead, there are disparate organizations, the connections among which cannot even be called a network. This article will describe three discrete – but at times overlapping, interacting, and complementary – institutional settings where activities one could recognize as TA are occurring: government agencies, non-governmental organizations, and academic research centers. The paper will conclude with a brief discussion of the challenges and roadblocks to institutionalized TA in the US.

Introduction

When one thinks of institutionalized technology assessment (TA), whether in the context of the United States or elsewhere, one invariably calls to mind the Office of Technology Assessment (OTA). In service to the US Congress, OTA was the first and largest “parliamentary” TA office. Scholars, journalists, and participants have often written on its history and methods (see Bimber 1996; Guston 2003; Hill 1997; Keiper 2004; Kunkle 1995) – and for good reason, since it marks an important, and still unique, experiment in TA. OTA’s origins reach back to the early 1960s¹ when tensions flared between the executive and the congressional branches of the federal government about access to technical and scientific advice (Bimber/Guston 1995). After much debate in Congress about what methods and styles of advice legislators needed at their disposal, the Technology Assessment Act, which would establish OTA, eventually passed and President Richard Nixon signed it into law in 1972. After a largely productive – if sometimes controversial and tumultuous – lifespan, OTA eventually became the victim of widespread budget cuts. In 1995, the lights went out on OTA.

Socio-technically minded academics and policy-makers often speak with a fond nostalgia for OTA. There are periodically public calls to refund the organization. Representative Rush Holt, a Democratic member of Congress from New Jersey who also has a PhD in physics, argued in the popular technology magazine *Wired* for “reversing the congressional science lobotomy” – that is, the defunding of OTA – “by restoring a once robust science resource to its rightful place” (Holt 2009).²

At the time of this article’s publication, however, OTA will have been defunct for nearly as long as it was operational. In these interim years, things have changed: For one, the political climate in the US is stormier than it was during OTA’s existence. The aggressive partisan divide in the contemporary Congress means everything has become a battleground for ideological contention, and technoscientific issues have not escaped appropriation by some partisans to accentuate or even define that divide. OTA had frequently come under fire by some Republicans, who accused it of being a tool for the Democratic Party (Keiper 2004). Today, there are no prospects for such an institution to serve both houses and parties in Congress until there are significant shifts in the political dialogue.

The lack of a centralized TA capacity moves the US back in time, pre-OTA, when TA functions existed but were so decentralized and varied that they were hardly recognized as such. There is no primary organization, public or private, to innovate new methods, establish best practices, or provide policy guidance. Instead, there are disparate organizations, the connections among which cannot even be called a network. The remainder of this article will describe three discrete – but at times overlapping,

interacting, and complementary – institutional settings where activities one could recognize as TA are occurring: government agencies, non-governmental organizations, and academic research centers. The paper will conclude with a brief discussion of the challenges and roadblocks to institutionalized TA in the US.

Government Agencies

Even without OTA, the US government gets TA through other means. We will largely focus on the ways TA emanates from the federal tier before pointing to TA at the state level.

After OTA shut down, Congress shifted responsibility for conducting officially sanctioned TA to the Government Accountability Office (GAO), at first as a pilot program and then, starting in 2008, as a permanent function. GAO was initially established in 1921 as the General Accounting Office until a 2004 legislative act changed its name. Observers often referred to GAO as the “congressional watchdog” for its audits and investigations of how the federal government spends public money. Part of GAO’s mission, however, overlaps with that of parliamentary TA, to “provide Congress with timely information that is objective, fact-based, nonpartisan, nonideological, fair, and balanced”.³

Similarly, the agency’s own broad definition of TA matches the spirit of the overarching goals of other TA organizations: “the thorough and balanced analysis of significant primary, indirect, and delayed interactions of a technological innovation with society, the environment, and the economy and the present and foreseen consequences and impacts of those interactions”.⁴ While this aim is laudable, and individual TA reports issued by GAO have been well-received, the TA function there has not come close to being able to replace OTA’s organizational capacity and leadership. GAO’s TA function – which has produced only seven reports since 2002 – is somewhat lost within a larger, non-technical organization.

The Federal Trade Commission (FTC) represents another increasingly TA-like function, this time from the executive branch of US government. While it does not have an official mandate for TA – its mission is to “protect consumers” and “promote competition” – FTC has, over the past fifteen years, been on the frontlines of analyzing and policing issues related to information privacy and the data economy. FTC holds workshops and writes in-depth reports on these issues, which usually receive heavy attention and coverage from journalists, academics, and policy wonks.⁵ Legal scholars Solove and Hartzog (2014, p. 583) find that, “in practice, FTC privacy jurisprudence has become the broadest and most influential regulating force on information privacy in the United States – more so than nearly any privacy statute or any common law tort”.

In addition to the few federal agencies that conduct both *de jure* and *de facto* TA, presidential committees and commissions often provide advice to the executive branch through the conduct of TA-like activities. For example, in January 2014 the President’s Council of Advisors for Science and Technology (PCAST) – a standing body advisory to the President and his Office of Science and Technology Policy – conducted a 90-day review of big data and privacy. PCAST released the resulting report “Big Data: Seizing Opportunities, Preserving Values” to the public, which became, according to the White House, “part of the foundation for future policies and actions that will help us stay at the forefront of this rapidly evolving sector”.⁶

There are also presidential commissions that are more ad hoc than PCAST, but more stable than any one of its studies. Perhaps the most high-profile TA-like commission has been the Presidential Commission for the Study of Bioethical Issues.⁷ This commission releases, on average, biannual reports that look at questions related to the ethical and social aspects of scientific research and technological development. Neither as technical nor as wonky as traditional TAs, the Bioethics Commission’s reports are much more philosophical in their orientation: They sketch out ethical frameworks, principles, and approaches; they grapple with larger political questions related to justice, fairness, and democracy; and they consider individual rights, dignity, and autonomy.

Even in the absence of OTA, the most well-institutionalized governmental TA capacities exist at the federal level. “The technology assessment movement that contributed to the creation of OTA had only a modest impact in the states” (Guston et al. 1997, p. 235), however, and while there is some demand in the state legislatures for their own technical information and analysis, the supply is short. Part of the problem is that tight budgets and limited resources mean that state legislators often relegate TA-like functions to staffers – who are already stretched thin and likely not experts themselves. This situation leaves most states without their own dedicated organizations for TA, and state legislators must instead rely on whatever forms of distributed TA they have access to and trust to give reliable analysis – often including not only explicitly political organizations like executive agencies and lobbyists, but also ostensibly non-political, non-governmental organizations like state-level academies of science and state universities.

Non-governmental Organizations

In addition to official government agencies, there are many non-governmental organizations (NGOs) that undertake TA. We will describe and provide some examples of three major categories: think tanks and policy advocacy, quasi-governmental organizations, and media platforms.

There are many think tanks and policy advocacy organizations that conduct familiar TA activities, e.g., writing research reports, providing real-time analysis and commentary via articles, blog posts, and press releases, and generating policy recommendations directed at political decision makers. Unlike some government agencies like the former OTA or the current GAO that strive to be bipartisan and neutral, these organizations have explicit ideological positions with regards to what values, interests, and worldviews their work supports. Possessing such a worldview does not necessarily degrade their TA. One does, however, need to be conscious of the choices and framings that influence their analyses and conclusions. These NGOs are varied, and enumerating an in-depth, ideologically ordered, cross-section of them is beyond our current scope – especially since their TA functions are usually just one part of a larger organization. Some examples include the regulatory focus on “Internet and Technology” within the right-wing Heritage Foundation and the “Open Technology Institute” program within the centrist New America Foundation. Recently, the Brookings Institution, a left-center think tank, released a white paper that made an argument for creating what the author called a “Federal Robotics Agency” (Calo 2014). This proposed agency – which would advise lawmakers, file court briefs, and fund new research – would serve as a source of in-depth knowledge about the social, legal, and policy aspects of the broad technical field of robotics. While motivations driving these legislative prescriptions are praiseworthy, white papers that take a strong stance on supporting efforts for (institutionalized) TA are still rare cases.

Curiously enough, though, a large number of NGOs with explicit focus on technology policy tend to argue for positions on the civil libertarian side of the political spectrum. Influential instances are the American Civil Liberties Union’s project on “Speech, Privacy and Technology”, the Electronic Frontier Foundation, the Center for Democracy and Technology, and Electronic Privacy Information Center. One could speculate about reasons for this ideological cluster: Perhaps new technologies, especially those related to digital information and communications, pose a greater – or at least more obvious – actual and potential threat to civil liberties than previous technologies did; or perhaps articulate, well-positioned, and wealthy people advocate for these libertarian policies that suit both their ideological disposition and their interests in these technologies.

While think tanks and policy advocacy organizations vie for attention in a decentralized TA environment, one large, centralized player does remain – the quasi-governmental National Academies complex, composed of the National Academy of Sciences, the National Academy of Engineering, the Institute of Medicine, and the National Research Council. The National Academies’ TA capacity – the scope of topics, the process for conducting studies, the prolific output (two to three hundred reports annually),

and the authoritative position – is, perhaps, the closest institutional proxy to OTA that exists in the US today – indeed, many high-ranking OTA personnel moved to the Academies. The National Academies’ wide-ranging TA is unique when compared to other quasi-governmental organizations that only focus on specific technologies, e.g., the “Project on Emerging Nanotechnologies” partnership between the Woodrow Wilson International Center for Scholars and the Pew Charitable Trusts.

An emerging trend of media platforms has begun to serve TA-oriented functions. These platforms strive to present analyses, arguments, and recommendations in a way that a non-specialized audience can understand and incorporate into their lives. Such platforms are still scarce, but there are notable vanguards including the “Future Tense” program – a partnership between the New America Foundation, *Slate* magazine, and Arizona State University – which aims to “explore emerging technologies and their transformative effects on society and public policy.”⁸ Through a fellowship program, a regular series of public events, and a dedicated channel on *Slate.com*, Future Tense presents a multi-scalar way of spreading its impact. Another example is *The New Atlantis: A Journal of Technology and Society*, an outlet that describes itself as “an effort to clarify the nation’s moral and political understanding of all areas of technology.”⁹ Specifically targeted at policy-makers and scientists, as well as an interested public, *The New Atlantis* is one of a few hybrid outlets that tow the line between professional journal and popular magazine. It does so by combining elements of academic rigor and socio-technical topics with the argumentative style and lucidity of a political commentary magazine. The hope is that such a synthesis hits the right balance where technological topics can be assessed in a way that has broader political and socio-cultural impacts. Platforms like Future Tense and *The New Atlantis* are relatively new, so it remains to be seen how effective they actually turn out to be at providing fresh approaches to both the practice and dissemination of TA.

As media platforms, Future Tense and *The New Atlantis* also represent the work of think tanks and policy advocacy groups expanding their vision and audience beyond traditional, narrowly cast decision makers and toward the educated public. A group called Expert and Citizen Assessment of Science and Technology (ECAST) pursues a similar effort, but oriented toward the creation of participatory TA (pTA). Rather than advocate for a recreated OTA, a group representing academic research (Arizona State University), science museums (Museum of Science, Boston), quasi-governmental organizations (the Woodrow Wilson International Center for Scholars), non-governmental organizations (the Loka Institute), and citizen science (Science Cheerleader and SciStarter) came together in 2010 to create ECAST. While marginally institutionalized, ECAST has nevertheless spearheaded US involvement in the

participatory project “World Wide Views on Biodiversity”, organized by the Danish Board of Technology, and has received a cooperative agreement from the US National Aeronautics and Space Administration to conduct a pTA of NASA’s planned Asteroid Initiative.

Academic Research Units

For readers of this journal, perhaps the most familiar modes of TA – and the ones they are likely most directly contributing to – are those stemming from academic research units. These university-based organizations grew up around the TA-like funding schemes from public and private sponsors, which provide the resources needed to coordinate and direct research outcomes. They all operate differently, based, in part, on the parameters, goals, and conditions inherent to external funding sources. But there is a more general family resemblance among these organizations that reflects the culture of their academic context. Unlike the other institutional categories we describe, TA originating from academic research is most heavily geared towards epistemic contributions, dialogue, and critique, with an emphasis on academic publishing, and with some organizations undertaking pTAs and/or writing white papers for industry and policy-makers. While academic research centers are often funded by government agencies (e.g., the U.S. National Science Foundation [NSF] or U.S. Department of Energy), their forms of TA tend to be somewhat more removed from policy-makers than think tanks and quasi-governmental agencies. Many such activities have been spawned by connecting societal research to new or emerging science and technology research, e.g., the Ethical, Legal and Social Implications (ELSI) Research Program attached to the Human Genome Initiative and the social and ethical implications (SEI) research attached to the National Nanotechnology Initiative.

Examples of the latter are the two Centers for Nanotechnology in Society, one at Arizona State University (CNS-ASU) and the other at University of California, Santa Barbara (CNS-UCSB). NSF funds these centers to conduct a variety of academic research, public engagement projects, and informal science education initiatives (such as working with science museums) – many of which revolve around questions of governance. Another example is the Belfer Center for Science and International Affairs (BCSIA) at Harvard University, which focuses on the intersections among science, technology, environment, and security. BCSIA advances scholarly knowledge and takes an active role in providing policy advice to lawmakers, diplomats, and military leaders. A third is the Center for Internet and Society at Stanford University, which researches information and communication technology and law, focusing on regulation and legal protection for civil liberties, privacy, data protection, and network neutrality. While lodged in universities, these centers and their numerous cognates are not very different from their counterpart “think tanks” in NGOs.

Conclusion

In the US context, TA comprises a highly distributed set of organizations, which are at best loosely networked together by a broadly shared and overarching function, but distinguished by varying capacities, methods, values, intentions, and goals. On one hand, distributed TA allows for an agile, bottom-up style where not one particular type of TA necessarily becomes dominant and shuts out other alternatives. On the other hand, the basic challenge with distributed TA is that there is little or no coordination of what subjects are studied, how they are analyzed, and how to ensure assessments have impact. There are gaps and clusters in the distributed TA network. That is, we see partial coverage of scholarly issues – with clusters around, for example, civil liberties like privacy and free speech or bioethical concerns related to research conduct and individual harms – and of existing or emerging technologies – with clusters around, for example, nanotechnology, information and communication technologies, and environmental topics.

The purpose of this paper is to give an overview of the institutional landscape. Therefore, we are reticent to go further than that descriptive goal by providing our own blueprints or predictions about what the future holds for TA in the US. As we see it, right now the National Academies complex represents the most holistic, diversified organization, but it is still independent and discrete, just a larger node in the network. There is not a single institution that acts like a leader, whether through coordinating dispersed efforts, serving as a clearing house for best practices, or ensuring influence and impacts. Much more planning, communication, and resources are needed before such an institution, or small group of institutions, could be created to oversee, manage, and tighten the network of distributed TA.

It is also possible that things will remain stable, and widespread debates continue to be the norm. Worse, the capacity for TA could degrade further, until it is nothing more than *ad hoc* advocacy and speculation. But one thing is certain: The nature of the present distributed model is rife with too much uncertainty to be sure of what will emerge.

Moreover, it is difficult to point to one primary cause for this form of distributed governance. The reasons likely comprise a diverse set of factors. Anything beyond (educated) speculation, however, would require a study that exceeds the boundaries of this paper. As explained in the introduction, fierce partisanship in the US impedes legislative endeavors such as creating new agencies or granting robust capacities to existing ones. Additionally, “technology” and “innovation” hold positive, even revered, positions within the dominant worldview in the US. That is, for many, innovation is an end in itself – rather than a way to make progress toward improved public health, sustainable energy production, etc. –, so any self-conscious attempt at governing the

development or implementation of a technology is seen as unnecessary, or even backward. When combined with the iron grip of the invisible hand of capitalism, the technological optimism of American culture can put quite a stranglehold on (institutionalized) TA in the US.

Disclosure Statement

Jathan Sadowski previously worked for the “Future Tense” partnership between the New America Foundation, *Slate* magazine, and Arizona State University, and he is a graduate student in CNS-ASU. Dave Guston is a principal in ECAST, and the director of CNS-ASU.

Notes

- 1) Inouye and Süsskind (1977) argue that OTA's lineage reaches back, indirectly, to a 1937 government report, *Technological Trends and National Policy*.
- 2) In-depth assessment of the many lessons to be learned from the OTA experience can be found in other volumes (e.g., Morgan/Peha 2003).
- 3) <http://www.gao.gov/about/index.html> (download 6.8.14).
- 4) http://www.gao.gov/technology_assessment/key_reports (download 6.8.14).
- 5) FTC's most recent report was released in May 2014: “Data Brokers: A Call for Transparency and Accountability”; <http://www.ftc.gov/news-events/press-releases/2014/05/ftc-recommends-congress-require-data-broker-industry-be-more> (download 13.11.14).
- 6) <http://www.whitehouse.gov/issues/technology/big-data-review> (download 7.8.14).
- 7) <http://bioethics.gov/about> (download 7.8.14).
- 8) <http://futuretense.newamerica.net/> (download 7.8.14).
- 9) <http://www.thenewatlantis.com/about/> (download 7.8.14).

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Experiments in Technology Assessment for International Development: What Are the Lessons for Institutionalisation?

by Adrian Ely, University of Sussex, Patrick van Zwanenberg, CENIT, and Andrew Stirling, University of Sussex

Several countries across the OECD have a relatively strong history of using technology assessment (TA) to inform science, technology and innovation (STI) policies. But many lower income, developing countries lack the capabilities and institutions for doing so. Despite its more general potential role in this area, TA has been used relatively little (in or outside the OECD) to inform and challenge investments and policies that address international development objectives. This paper discusses two case studies in which non-governmental TA exercises have focussed on international development objectives in and across lower income countries. Both have made particular efforts to include broader perspectives in the TA process. The paper asks what we can learn from these networked “experiments” and explores possibilities for further institutionalisation of TA for international development.

Introduction

International organisations (see e.g. UN System Task Team 2012) often point to key roles for science, technology and innovation (STI) in helping to foster sustainable and inclusive development. This includes moves towards a “green economy in the context of poverty alleviation and sustainable development” discussed at the 2012 Rio+20 conference (UNEP 2011) and to other international development objectives such as the effective implementation of the UN Framework Convention on Climate Change (UNFCCC), maintaining progress towards millennium development goals (UNDP 2011) and the formulation and realisation of sustainable development goals (OWG-SDGs 2014).

Annual global expenditure on research and development continues to grow beyond one trillion dollars. The current systems of governance mean, however, that only a small proportion of this investment is focussed on challenges to international development. Even when investments explicitly focus on development objectives, their wider long-term efficacy is often in question (STEPS Centre 2010). This is because the existing efforts are steered by powerful incumbent interests, which are often misaligned with those of the most vulnerable groups and frequently fail fully to account for social, technical and ecological complexities and uncertainties. Given these conditions, how can the oft-cited potential of STI in attaining these goals be better realised?

Technology assessment (TA) can directly address these challenges. As defined here, TA is a broad set of practices aimed at informing, shaping and prioritising technology policies and innovation strategies by deliberately appraising in advance their wider social, environmental and economic implications. The aim of this paper is to help us understand how TA can address the imperatives discussed above. It provides examples of initiatives that have attempted to do so and explores specific ways in which these kinds of initiatives may be institutionalised. To do this, we first describe the changing approaches to TA in the OECD and in developing countries over the past four decades. Drawing on evidence from two case studies, we analyse how particular aspects (especially the broadening out of inputs to TA and the opening up of the outputs of TA, discussed in more detail by Ely et al. 2014) have allowed some initiatives at the national or international levels to address some shortcomings in existing patterns of innovation. These findings raise significant practical issues for future TA initiatives, especially as these relate to the harnessing of science and technology for international development.

Debates around Technology Assessment Across the OECD: Towards Broadening Out and Opening Up

TA emerged in the 1960s and was first institutionalised in the United States Office of Technology Assessment (OTA) in 1972, and subsequently in several other OECD countries (van Zwanenberg et al. 2009). These institutions arose partly in response to political controversies around technologies such as civilian nuclear energy. They were seen by proponents as providing unbiased analysis of the impact of a technology, usually to Congress or parliament. Typically offered directly to political decision-makers, the aim was to guide public decisions about which technologies should receive state support. Brooks argued that “ideally the concept of Technology Assessment is that it should forecast, at least on a probabilistic basis, the full spectrum of possible consequences of technological advance, leaving to the political process the actual choice among the alternative policies in the light of the best available knowledge of their likely consequences” (Brooks 1976). However, arguments have been made since the outset that this kind of forecasting is neither practically achievable nor neutral and objective.

In practical terms, it has long been recognised that the open, path-dependent dynamics of innovation (Nelson/Winter 1982; Rosenberg 1982) implicate deeper and more intractable forms of uncertainty than it is possible to address in the probabilistic approaches of risk assessment advocated in Brooks’ argument. An extensive literature has illuminated contrasting states of “uncertainty” – where probabilities are not known (Knight 1921); “ambiguity” – where there is disagreement over defining, ordering or interpreting the possibilities themselves (Dreyer/Renn 2009); and “ignorance” – where we don’t know what we don’t know (Wynne 1992). Each poses more profound challenges for TA than are encompassed in the mere state of risk – which assumes both outcomes and probabilities can be definitively measured (Morgan/Henrion 1990). Yet these crucial lessons are often obscured by the expediently reductive language of probabilistic approaches, as if all forms of incomplete knowledge remain equally tractable to risk assessment. Promoting participation in TA has been proposed as an appropriate response to the uncertainties that characterise technological modernity (Hennen 1999). More recent work has suggested that more explicitly appreciating the distinctions between these contrasting aspects of incomplete knowledge or “incertitude” (Stirling 1998; Stirling/Gee 2002) reveals possible roles for greater diversities of approaches in TA. Some of these have been the object of experiments within Europe’s diverse TA landscape (see for example results from the PACITA project¹ and Ganzevles/van Est 2012, also in this volume).

Other critics have drawn into question the objectivity of technical TA, pointing out that assessments were necessarily dependent on non-

technical and often implicit framing assumptions, especially about the nature of the problems prompting assessment, the questions to be asked, the scope of appraisal, the options under consideration, and the appropriate methods to employ in considering them (Wynne 1975).

One response to both the practical challenges of dealing with incertitude and the need to make explicit and interrogate the framing assumptions involved in TA has been to broaden out the inputs to technology assessment (Stirling 2008; Ely et al. 2014). Briefly, broadening out inputs involves extending the scope of a TA exercise in a number of dimensions. An appraisal could, for example, include a greater variety of problem definitions and technological and non-technological options, implementing policies, benefits and impacts, other relevant issues, uncertainties and ambiguities, possibilities and scenarios, values and understandings, and methods of analysis and deliberation. The more even the attention to reasonable alternatives in each of these dimensions, the more broadened out is the particular exercise (Stirling 2008).

These issues of breadth concern the inputs to technology assessment, i.e. the uncertainties, issues, perspectives and options that are included in the appraisal. Another dimension concerns the outputs of TA to policy processes and wider political debates. In comparison to broadening out inputs to TA, opening up its outputs involves not so much the deliberations and analysis that are internal to a given exercise, but the manner in which the eventual findings are communicated and enacted – not only to clients, but also to associated policy-making debates and wider political discourse. Rather than providing a single, ostensibly definitive (objective and comprehensive) characterisation of a technology or related problem (as in old models of TA), an opening up approach delivers a more plural and conditional set of outputs. Each explicitly reflects not only an alternative reasonable recommendation, but also the associated assumptions, circumstances or perspectives (Stirling 2008). In short, this involves the outputs of TA being expressed not as single, ostensibly definitive, results, but as plural and conditional reflections of whatever constitutes the most salient axes of sensitivity that emerge in the analysis. This means highlighting symmetrically a number of in-principle contrasting but equally valid interpretations for appropriate ways forward, each with its associated assumptions, rationales or contexts (Stirling 2010).

Opening up TA can help decision-makers and funders by attending to policy options, issues, uncertainties and perspectives that would otherwise be marginalised. Although not uniquely determining a specific decision, plural and conditional findings can inform political commitments about which kinds of projects to prioritise. And, although not preventing clear political decisions, opening up TA can usefully highlight the benefits of diversity (Stirling 1998; Stirling 2007; Sclove 2010).

These ongoing debates have emerged in very particular governance contexts (characterised by relatively established parliamentary democracy and scientific institutions and by comparatively high average incomes and access to education that seem to assist a positive role for TA). This is not the case in many parts of the world in which public controversies around different technological options form less of a focus of public debate and trans-disciplinary research is less developed. The next section discusses debates beyond the OECD countries, in which most of the TA scholarship and practice has so far been conducted.

Technology Assessment in the Context of a Developing Country

Technology assessment has been much less common outside the OECD countries. This is despite longstanding recognition of the dangers of introducing technologies to developing countries without appropriate prior user engagement, assessment or foresight – leading to low uptake, wasted investments and counterproductive consequences (Châtel 1979; Chambers et al. 1989; Goonatilake 1994; Scoones/Thompson 2009). Where it has been conducted in developing countries, TA has tended to have been largely technical in nature, carried out within centralised institutions or by external consultants to direct government or donor projects. Explicit attention to the diverse priorities and understandings of different stakeholders and citizens has been rare.

This is despite the fact that current appreciations of physical, social and political dynamics in international development (Scoones et al. 2007) call for a more systemic view that attends to multiple and interacting forms of innovation. In the context of a developing country, greater recognition of the implications of complexity, uncertainty and divergent values is necessary in order for TA to explore the plurality of alternative possible “pathways to sustainability” and their associated social and environmental implications (Leach et al. 2010). As discussed above, broadening out the inputs and opening up the outputs of TA can address challenges presented by competing perspectives on innovation-related problems and potential solutions.

The kind of narrowness of TA described above can be especially problematic in lower income countries. Here – despite strenuous and inspiring efforts – the limited capacities of governance mean that the asymmetries of power, privilege and vulnerability often remain more acute. In particular, destitution leads to the exclusion of particular communities. Chronic barriers to educational access and political representation aggravate this marginalisation. These predicaments strongly amplify the rationales for broadening out TA in the ways discussed above. Although not offering panaceas, many methods for broadening out, mentioned above, can help reinforce wider institutional reforms to

help extend the range of alternative options and perspectives engaged as inputs to TA and hence help mitigate the ubiquitously distorting effects of privilege and power.

Similarly, the typically greater diversity in developing countries makes it all the more important to open up TA outputs, delivering plural and conditional advice to disparate governmental and non-governmental actors typically involved in development processes. In particular, being explicit about the context specificities, framing assumptions and perspectives upon which the outputs of TA depend can help TA facilitate wider questioning of particular innovations, their transferability to other contexts and the ways in which these are conditioned by power gradients. A further important implication of opening up TA outputs is that careful design can reduce the costs and burdens of more centralised, technical approaches. This is especially important in the setting of an underfunded developing country. The reason is that opening up can relax the pressure to claim that a single TA appraisal is unassailably objective and comprehensive – and to avoid the associated demands for costly (but ultimately futile) pretensions of a definitive analysis.

Limited numbers of participatory TA activities associated with emerging technology and other potential solutions to development challenges have taken place in low income countries. Interest has increased since the 1990s in participatory, “deliberative and inclusionary processes” (DIPs) in areas like the potential role of genetically modified crops in food or fibre production (Wakeford 2001; Wakeford 2004), as carried out in India (ActionAid 2000), Mali (IIED 2007), Zimbabwe (Rusike 2003), and Brazil (Toni/von Braun 2001). Linking across countries in a co-ordinated approach has been relatively rare. We now go on to discuss two case studies that to varying extents displayed tendencies to broaden out and open up TA and were co-ordinated to varying extents across national borders, before reflecting on their implications for institutionalising TA for international development.

The International Assessment of Agricultural Knowledge, Science and Technology for Development

The International Assessment of Agricultural Knowledge, Science and Technology for Development, (IAASTD) was a joint initiative of the World Bank, UNDP, FAO, and other institutions. Running between 2003 and 2008, its aim was “to assess the impacts of past, present and future agricultural knowledge, science and technology on the reduction of hunger and poverty, improvement of rural livelihoods and human health, and equitable, socially, environmentally and economically sustainable development” (IAASTD 2009, p. vi). A networked, international multi-stakeholder steering committee established the scope –

and the processes and procedures by which it would be conducted and governed – following consultation with over 800 participants from diverse sectors and locations (Scoones 2009). The assessment was overseen by a multi-stakeholder bureau, which also selected 400 scientists (from a range of disciplines and institutional settings) to author the report. The resulting five regional reports and one global report took four years to produce.

The inclusion of such geographically and sectorally diverse groups (including business, civil society and policy-makers, if not wider citizen participation) had several important consequences. First, it meant that many often-excluded perspectives were voiced – on occasion finding their way into the overall report. As one participant noted: “perhaps for the first time, those advocating sustainable agriculture and indigenous knowledge had been given a place at the table, and got (some of) their views acknowledged” (Scoones 2009). Second, it allowed a range of viewpoints, perspectives, arguments, assumptions and types of evidence to be brought together in one place. One of the key findings of the IAASTD is that there are diverse and conflicting interpretations of the past and current role of agricultural science and technology in development, which need to be acknowledged and respected (IAASTD 2009).

Broadening the scope of IAASTD beyond agricultural science and technology (to include other types of relevant knowledge held by agricultural producers, consumers and end users and to also assess the role of institutions, organizations, governance, markets and trade) led to the options under consideration becoming correspondingly more ambitious and wide-ranging. Attention stretched to include issues such as: the system of agricultural subsidies in the OECD countries; trade rules and intellectual property law; and traditional and local knowledge in community-based innovation. For some, this was too broad: “...if you propose everything, then you don’t prioritise anything” observed one commentator (Coghlan 2008).

While the IAASTD process tried to encourage a (broad) plural and inclusive process that genuinely engaged with political and evaluative – as well as technical – issues, it implicitly held an expectation that uncertainties could be resolved (or at least narrowed) by a rational, objective, scientific debate among expert peers, leading to common understandings and consensus visions for the future (Scoones 2009). To some extent, the tension between these contending characteristics was managed through informal debate and argument rather than allowing different political and value positions to be explicitly acknowledged. On particularly contentious issues, such as the potential utility of genetically-modified (GM) crops, consensus was unobtainable and recalcitrant differences of opinion led to the withdrawal of many private sector participants (Nature 2008). Such antagonistic dynamics are not necessarily without value, however the IAASTD did not use

the opportunity to explore the worldviews and perspectives that underlay this polarisation or attempt to offer plural and conditional outputs that reflected them.

At the same time, the IAASTD did seek to delineate where there was consensus and where there was uncertainty, and to discuss minority points of view. Furthermore, it did not make unitary recommendations, only a series of options for action at the global level and each of the regional levels, on the basis that different stakeholders who might wish to act on those options have different sets of priorities and responsibilities, and operate in different circumstances. It is difficult to ascertain any concrete impact on funding of agricultural innovation, however the recognition of the multifunctionality of agriculture has been maintained in subsequent internationally-cited reports on similar topics (e.g. Foresight 2011) and thus to a limited extent opened up the debate in this area. An IAASTD spokeswoman argued that “even changing perceptions of farming is quite a shift from the past 50 years, and they should drive the agenda for the next 50” (Coghlan 2008).

Exploring the Role of New Technologies in Clean Water Provision Through Stakeholder Events in Zimbabwe, Peru and Nepal

In a rare example of nanotechnology-focussed TA-type activities in developing countries, the international NGO Practical Action joined with other stakeholders to undertake the “Nanodialogue” initiative on clean water provision in Zimbabwe and a range of related activities in Peru and Nepal. The Zimbabwe event unfolded over three days in 2006, when UK researchers from the think-tank DEMOS and the University of Lancaster gathered in Harare with Practical Action and local stakeholders, scientists and citizens from two communities in Zimbabwe, to investigate the general challenge posed by providing clean water (Grimshaw et al. 2007; Stilgoe 2007; Mellado 2010). The stakeholder workshop approach illustrated by the Zimbabwe nanodialogue was also used in similar exercises co-ordinated by Practical Action to investigate potable water provision in Nepal (Grimshaw 2009) and issues around water and health in Peru (Mellado 2010). The focus of the current analysis, however, is on the Zimbabwe exercise.

As part of a larger, UK government-supported programme of nanodialogues, the process was organised around the question “can nanotechnologies help achieve the millennium development target of halving the number of people without access to clean water by 2015?” However, it focussed on identifying and understanding various sources of problems in water provision, as well as discussing a number of potential technological and non-technological solutions, with nanotechnologies included as just one option among many. By including academics from the Zimbabwean Academy of Sciences and

UK and South African universities, representatives from several Zimbabwean Ministries and many other public agencies, and by directly involving communities in a participatory process, the Zimbabwe nanodialogue broadened out both technical and non-technical inputs to the process. Addressing not only technological, but also cultural and political issues in discussion, it also delivered a number of general recommendations to government and non-government actors, both national and international.

The process also included members of two different citizen communities, crucially differentiating perspectives, rather than seeing “users” as a uniform group. This enabled attention to be paid to a diversity of contexts in which nanotechnologies might be employed – with issues such as control and ownership put forward as key issues for consideration in ways that might otherwise have been neglected. Organisers concluded that the inclusion of policy-makers and other innovation system actors at the workshop led to a greatly improved understanding and capacity than would have been the case for a less participatory TA exercise.

Despite being named a nanodialogue, the scope of the Zimbabwe TA-like exercise focused on diverse policy responses to water challenges, looking well beyond nanotechnology. Indeed, the shared finding emerged after the first two days that “there is no real water quality issue that cannot be solved with existing technologies” is itself an illustration of a kind of opening up that would be impossible under a more singular focus on a particular technology. However, the final outputs of the nanodialogue were not limited to this consensus. Discussions raised a large number of further questions, including those targeted at scientists about the possibility of using nanotechnologies in combination with other options, as well as the timeframes and specific conditions under which these might be favourable. The inclusion in the report of unresolved questions, ambiguities and uncertainties, alongside more specific findings and recommendations, also provided a more open basis for future societal discussion. This may not have helped bring about direct policy change (and to some extent subsequent investment was in any case precluded by the context). But the process highlighted the complexities of, and alternatives to, the focal set of new technologies.

Lessons for New Institutional Models of TA for International Development

Based on this evidence, what implications arise for new TA institutions, especially those focussing on international development challenges with a global dimension? In particular, what can these examples suggest for institutionalised approaches in developing countries? Here, a number of lessons emerge for the design and implementation of TA institutions for international development. Taken together with other studies in this area (e.g. PACITA), these suggest the following:

- TA exercises are best viewed in context – as crucial elements in wider processes of social appraisal. The key role of TA, therefore, is not to undertake the entire task of justifying technological decisions, but to catalyse, inform, enable and strengthen these broader social and political processes.
- There are synergies – not just tensions – between participatory and expert-led approaches to TA. Broad, participatory approaches directly address challenges of framing the problems and options to be addressed – with outputs offering usefully to inform more traditional expert-based analysis.
- The networked, multi-actor example offered by exercises like the IAASTD can offer a more flexible and agile approach that allows conversations across disciplinary, technological and sectoral domains (vital to respond to the complex challenges of sustainable development).
- Drawing on external sources of knowledge and experience beyond a central TA office may be particularly advantageous in developing country settings, where in-house expertise and capacity may be especially lacking. Within a networked approach, the core role (for example of a government agency) centres on co-ordinating, rather than conducting, TA.
- Capacities in methods and practices for these kinds of TA are often lacking in many developing countries. Data and statistics that can inform TA activities are also often scarce. Here, appropriate pooling of resources between countries may enable more effective TA. At the same time, capacity within co-ordinating institutions is a prerequisite to developing networked approaches.
- Resources and capacity may often also be lacking for effective political decision making in response to TA. Acknowledgement of these realities forms an integral part of the quality of openness, not least to avoid disillusionment and disrespect of participants. Nevertheless, the broadening out and opening up of TA described here may generate tacit learning within wider innovation systems, even if particular outputs do not become explicit bases for concrete decisions.
- There is a need to move beyond a series of unconnected, isolated TA experiments, towards more coherently-co-ordinated (but still diverse) internationally-networked approaches, allowing participatory TA to be scaled up in wider areas of the world. The focus should therefore not just be on specific TA exercises in particular settings, but also on broader trans-national programmes, in order to enable cumulative distributed learning about contending innovation imperatives and possibilities and the associated appropriate TA processes.

It is easy to speculate on the potential institutional sites in which internationally networked technology assessment could be based. However, the evidence base for any such proposals is absent. There are very few cases where citizen perspectives have been sought to inform policy making in a co-ordinated way beyond OECD countries (see for example Worldwide Views on Global Warming² which involved exercises in 38 nations and was co-ordinated by the Danish Board of Technology, although not in TA *per se*). International associations focussing on technology assessment (with geographic spread beyond that of the European Parliamentary Technology Assessment³ or earlier attempts such as the International Association of Technology Assessment and Forecasting Institutions), NGOs (e.g. the International Center for Technology Assessment; <http://www.icta.org>) and intergovernmental organisations (UN Commission for Science, Technology and Development) could all have roles to play. Key to the efficacy of such institutional arrangements, however, will be their governance structures and articulation with the wider innovation systems in which they would need to be embedded.

Indeed, the most crucial systemic requirements for effective broadening out and opening up of TA are the same qualities towards which this arguably contributes: more responsive relations in the governance of innovation between business, academia, government and civil society. By this means, the broader and more open forms of TA advocated here offer ways to help enhance both technical robustness and societal relevance in global innovation systems. Only by enabling these more networked and internationally co-ordinated kinds of TA might the formidable energies of worldwide innovation systems become more socially equitable, environmentally sustainable and democratically legitimate.

Notes

- 1) <http://www.pacitaproject.eu/>
- 2) <http://www.wwviews.org>
- 3) <http://www.eptanetwork.org>

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Cross-European Technology Assessment: Visions for the European TA Landscape

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The whole of Europe is getting more closely connected and, with the rapid technological development, there seems to be a need for establishing networks and knowledge bases in a cross-European manner. This can be advantageous for both the national and regional levels of policy making as well as for the European one. This paper discusses the past, present and future of cross-European work going on in the field of parliamentary technology assessment (PTA).¹ The main questions to be dealt with will be: What did we learn from past cross-European projects? What is the additional value provided by cross-European TA? And how can cross-European TA be structurally established in the long term? To answer them, we analyse the existing framework conditions for cross-European projects, compare ten cases of previous cross-European projects and draw some lessons. In the final part we present conclusions and recommendations for fostering cross-European cooperation within the TA community.

Technology Assessment in Europe

In the 1970s, the OECD, the European Commission (EC) and individual states took initiatives to introduce technology assessment in Europe. Following this, offices for parliamentary technology assessment (PTA) were established in several European countries and regions. In 1990 – following an initiative of Lord Kennet, at that time chair of the advisory board of the U.K. parliamentary TA institution (POST), the European Parliamentary Technology Assessment (EPTA) network was established. Founding member institutions were POST, the Parliamentary Office of the Evaluation of Scientific and Technological Choices – FR (OPECST), the Office of Technology Assessment at the German Bundestag (TAB), the Rathenau Institute, the Danish Board of Technology (DBT), and the Science and Technology Options Assessment at the European parliament (STOA) (Wennrich 1999). Today, EPTA has 14 members and three associate members (<http://www.eptanetwork.org>). It aims at strengthening the links between parliamentary offices for TA throughout Europe, and establishing TA as an integral method advising parliaments in decision-making. The approaches to TA applied by the member institutions vary widely, both in their organizational structure and working methods.²

Although a number of joint projects have been conducted in the framework of EPTA or funded by the European Commission (see below), one cannot speak of regular cross-European cooperation in TA up to now. The whole of Europe is getting more closely connected, the EU is growing, and the rapid technological developments have implications that go beyond national borders. In this respect, there seems to be a need for establishing result-oriented European cooperation and networks in the field of TA, so that technological innovation can be considered in a global perspective, taking into account both national and European realities.

Based on our personal experience and the analysis of several cross-European projects, this paper discusses three topics: What is the added value of cross-European TA work? Who are the addressees and target groups of cross-European projects? And what are the possible tensions between national/regional TA structures and the ambition to “act European”? Within the framework of the PACITA (Parliaments and Civil Society in Technology Assessment) project two workshops have been organized where these questions have been discussed between PACITA partners and other TA actors in Europe³. In addition, partners in the PACITA project have compiled several case descriptions of cross-European projects conducted previously, which have been compared with regards to process, financing, mode of cooperation etc., in order to find the strengths and weaknesses of cross-European projects (Barland et al. 2012). The endeavour to achieve closer cooperation between European TA institutions lies at the core of the PACITA initiative. The project has set an aim

to foster the European scope of technology assessment and create a vision for cross-European TA in 2020.

Cross-European TA: A Definition and a Short History

In the context of this paper we define cross-European TA as TA (projects) done by a group of TA institutions across borders. It implies a common objective and cooperation but not necessarily the use of the same methods. Cross-European TA is not necessarily pan-European TA in the sense that the whole of Europe (28+) is covered in terms of membership, whether in the consortium or with regard to the results and impact of the project. Pan-European TA on the one hand aims at a collective Europe, whereas cross-European TA cherishes the diversity of approaches and cultural contexts in order to reach added value for all addressees and involved actors.

The history of cross-European TA projects more or less starts (at least within the EPTA context) with the EUROpTA project (1998–1999), which was partly financed by the Targeted socio-economic research TSER programme of the EC in FP4. This first “joint project” already showed some characteristics of cross-European projects: It was the wish of some members of EPTA to work together on methodological issues of participatory technology assessment (pTA). EUROpTA evaluated pTA and its contribution to European policy. It scrutinised the theoretical and conceptual frameworks that underlie both theoretical discussions and practical initiatives of pTA. It clearly showed the differences in Europe and the potential and limitations of pTA at that time in different socio-political contexts. It created added value for the understanding of the different ways pTA could be utilised in different countries and issued guidelines for practice in pTA based on this analysis. From a procedural point of view, cross-European cooperation in this project clearly revealed that in interdisciplinary and intercultural research settings it takes time to find a common understanding and common ground for further work, which then can be highly productive and creative. As time is costly, this leads directly to the next lesson learned: (enough) resources and flexibility are needed. Already this first “joint project” showed in a paradigmatic way some of the key issues we found in our analysis of later projects. The next attempt was the TAMI project (2002–2003), which again was a methodological project that tried to identify “best practices” for different problem contexts in order to develop guidance for the selection of TA methods. TAMI again was to a great part driven by EPTA members and was financed by the EC under the STRATA programme in FP5.

These two projects may be seen as early forerunners. The list below shows the ten further projects with TA units as partners that were analysed during the PACITA project (which in itself is a cross-European project).

ICT and Privacy in Europe (EPTA, 2004–2006)

Meeting of Minds – European Citizens’ Deliberation on Brain Science (FP6, 2004–2006)

Energy transition in Europe (EPTA, 2006–2007)

PRISE – Privacy enhancing shaping of security research and technology – a participatory approach to develop acceptable and accepted principles for European security industries and policies (EC/PASR, 2006–2008)

Genetically modified plants and foods: Challenges and future issues in Europe (EPTA, 2006–2009)

Study on Human Enhancement (STOA/EP, Start: 2008–2009)

World Wide Views on Global Warming (mixed sources, 2008–2009)

Citizen visions on science, technology & innovation (CIVISTI)(FP7/SSH, 2008–2011)

Technology Options in Urban Transport: Changing paradigms and promising innovation pathways (STOA/EP, 2010–2011)

Nano Safety – Risk Governance of Manufactured Nanoparticles (STOA/EP, 2010–2011)

This list⁴ shows a broad range of different settings and characteristics of cross-European TA projects. Six out of the ten projects have been carried out by consortia with TA units only, and one project had a scope beyond Europe.

With regard to funding/initiators, the first group are so-called “EPTA projects”. These projects are based on the “Joint EPTA Project Framework”, where three or more members can initiate a project, which is open for participation by other EPTA members. They may be classical research projects like “ICT and Privacy in Europe” or rather short but comprehensive overview projects like “Energy transition in Europe”. They are based on the EPTA members’ own budget. At least for the first research-like projects, this turned out to be one of the weak points. Missing resources and no “external” client – not to be mixed up with addressee – tend to diminish the priority of such projects in the member organisations. This implies the danger of lower commitment by partners and therefore greater efforts at coordination. The later projects, focusing on collecting national policy overviews on a given topic, seemed therefore to be a more suitable format for EPTA projects. These overview projects use a common framework to be filled in by EPTA partners, which can be done in relatively short time. These projects do have a concrete aim and addressee. They are used to complement discussions of parliamentarians and TA practitioners at the EPTA conferences, which are

held annually in the capital city of the respective EPTA presidency's country. EPTA reports on five such joint projects from 2004 until 2014 are now available (<http://www.eptanetwork.org>). Further issues are synthetic biology and technology-related productivity in Europe and the USA.

The second group of projects are based on funding by the European Parliament (EP), represented by STOA (European Parliament – Science and Technology Options Assessment), which itself is part of the EPTA network. From this list of cases STOA commissioned three cross-European TA projects. Since October 2005, the European Technology Assessment Group (ETAG)⁵ has served as one of the contractors to STOA. Projects of this kind are clearly defined policy advice studies with a specific addressee (the EP) and are conducted within a rather tight framework.

The EC research framework programmes finance the third – important – type of cross-European TA projects. These projects react to calls of the EC, whereas the EPTA projects only rely on the assessment of the EPTA members as to whether an issue is relevant or not. So far the former have been conducted by small consortia involving a majority of TA institutions (like PRISE) or brought together a lot of different actors (like “Meeting of Minds”). Being bound to calls from the framework programmes restricts the flexibility with regard to themes to a certain extent. Nevertheless some TA institutions have cooperated in such FP projects in recent years; examples beyond those four listed above are: DESSI⁶ (2011–2013), SurPRISE⁶ (2012–2015) and PACITA⁷ (2011–2015).

The ten cases also show the broad range of methods employed in cross-European projects. All include desk research to a different extent, and six out of eleven used participatory elements in their work. The duration was 8 to 40 months and almost all projects at least tried to address policy makers on the European level in addition to those on the national and sometimes regional level. Most of them concluded with reports and more or less concrete recommendations – sometimes more openly referred to as “challenges” or “policy options”.

One of the problems that has been articulated is a loss of accuracy due to translation problems occurring in multi-national settings, which intensified as soon as laypeople participate. Multiple translations back and forth between national languages and the working language (English) of the consortia are very critical aspects and have to be given high attention.

Besides the categorisation based on financing we can observe a twofold development in the European scene. On the one hand, many of the cross-European projects rely on and cherish the diversity of approaches used in different countries and TA institutions. On the other hand, there are attempts to apply the same methodology in all the participating countries. The reasoning behind this is (i) to compare

results from different cultural settings and (ii) to be cost efficient by designing the projects only once. This second approach was applied by the PACITA project, which conducted three case studies in some of the participating countries by applying the same method in all of them.

From the small list of projects above and the formal categorisation alone, we can see a high diversity of procedures. Based on this we will now investigate further what this means for the future of cross-European TA.

Is There Added Value in Doing Cross-European Projects?

Although the emerging technologies debated in different countries are more or less the same, the contexts and timing of discussions as well as the shaping of technologies will differ nationally. Thus, cross-European TA can contribute to setting the agenda and providing policy support at the European level and at the same time informing the national science and technology discourses. All European countries (whether EU members or not) relate to European regulation in some areas. These areas of regulation are interesting subjects for cross-European TA, which could create a common platform between partners for assessing the national impact and implications as well as challenges to the national implementation of regulations.

PTA institutions have their mandate mainly focused on the national and regional sphere. Some have the explicit task to “watch trends in science and technology” (Ganzevles/van Est 2012) (both national and international), but for none is participation in international projects defined as a formal task. Identifying and understanding the added value in cross-European projects may help to open up and stimulate more cooperation while at the same time justifying international cooperation at the national level.

For TA institutions involved in cross-European co-operation, such participation itself can produce added value. The cooperation with other institutions provides a setting for institutional learning and an exchange of experience. How one approaches a topic, which method one chooses, and how a project is framed is highly contextual. Input from and discussions with other practitioners are mutually beneficial. It broadens the perspectives applied to the problems at stake and can shed light on overlooked sides of an issue. The networks can also strengthen capacity, both of the institutions and the PTA community as a whole: for PTA units with limited resources, the contact with other units enhances their portfolio and broadens their field of expertise and range of methods. This was the leading idea for the joint TA projects carried out within the framework of PACITA, which was very much appreciated as a means of integrating TA in their portfolio by PACITA partners from countries with no existing TA infrastructures so far. Within the PACITA framework different kinds of partners have conducted three exemplary projects using three

different methods. The projects on public health genomics, the future of ageing, and sustainable consumption should encourage TA activities in several European countries, including in those that do not yet have an established TA institution. PACITA has also created the TA Portal, which is an open resource for knowledge sharing and learning about TA.

More than ever, technological change is being driven by and is itself a driving force of globalisation. Therefore, it is logical that the assessment of new technological developments also adapts to the international or European level through networks and cooperation. European science policy has made a move from “science in Europe” to “European science” (Nedeva/Stampfer 2012). The focus has moved from the coordination of national projects, to the development of a more integrated, pan-European science base. Signs for this shift may be seen in the establishment of the European Research Area (ERA) and the European Research Council (ERC). Given this shift, it is getting even more important for TA to be present on a European level.

Whom to Address?

One of the main characteristics of many European TA units with a central role in their national context is their strong connection to the parliament. This is institutionally provided for by organizing the unit *inside* parliament (the parliamentary committee or parliamentary office models) (STOA 2012) or by identifying parliament as the main addressee in the mission statement of a TA institution (independent institute model) (Ganzevles/Nentwich 2014). Nevertheless, many of the PTA units additionally communicate their results to a larger audience consisting of different target groups including the scientific community, ministries or other governmental offices and the general public.

When the PTA activities move up to the European level, it becomes more difficult to identify addressees and potential target groups. If a contractual relationship is established with a policy making institution (the European Parliament in the case of ETAG or the Commission in the case of EU-funded projects), there is a TA client, and thus an addressee, with identifiable expectations and needs. However in the case of bottom up activities of cross-European TA initiated by EPTA, the addressee in the first instance would be the interested European public. Brussels serves as an important policy arena, with many important target groups within the EU represented. While in a national context there is a defined public sphere, there is no easily addressable “European public”.

Given this situation and knowing about the importance of a clear addressee as a prerequisite for having an impact, there is a clear need for cross-European TA to actively explore ways of identifying and establishing contacts with addressees and target groups at the European

level. First of all, a thorough dissemination strategy is needed in cross-European projects. Every project has to identify its own public, which most likely will be quite different from project to project. Second, it could be productive to have a more systematic view of addressees and target groups when working at the European level than at the national/regional level. If the goal of PTA is to provide input for knowledge-based decision-making, it might help to broaden the definition of who decision-makers really are. In a national context, the parliament and government stand out as the main decision-makers. In the European context, the European Commission and the European Parliament play important roles. Yet many others (e.g. lobbyists, NGOs, and the media) also take part in decisions and hold power in important discussions.

What Does It Mean to “Go European”?

For many PTA units, doing national projects and participating in European projects creates tension. Easing this tension might be one of the factors that can lower the threshold for doing cross-European TA. This tension is rooted in the fact that the mission of PTA institutions is mainly national in focus. Thus, participating in European projects might take both focus and resources away from their working programs. Therefore, providing sufficient additional resources from European funds for cross-European activities can be one important factor in lowering the threshold for national bodies to engage in European activities. The increasing participation in EU-funded projects also supports this notion. Institutions easily see the added value of joining a consortium when there are special funds available for working at the European level.

However, a strong argument can be made that cross-European TA may be stronger if there is structural financing for European cooperation which is not limited to individual projects. The opportunity to really establish cross-European TA as a field, and having the finances to the keep up the work, might make the European sphere more enticing. Long-term presence and more structural financing by a European programme or body would be an incentive for more cross-European work.

Being part of a European network is in itself of great value to many institutions. It gives input and updates both on topics of interest and developments in the field of TA. Networks like EPTA strengthen the position of TA in Europe and the rest of the world. Through EPTA and initiatives like PACITA, countries and institutions that seek to establish PTA structures can get access to a larger group of PTA units and to possibilities for mutual learning. Nevertheless the barriers described above have hindered a more vital development of cross-European TA.

Conclusions: The Need for Structural Financing and Organisational Representation of Cross-European TA

There are many arguments that prove the added value of doing cross-European work in the field of TA. Some of them are: mutual organisational learning; broadening the portfolio of members; being responsive; acting cost-efficiently; and being present at the relevant political level. But there are also some barriers: the difficulty to find the right addressee; the difficulty in making an impact on the European level; and the tension that can arise between the national/regional structures and resources when participating in cross-European work. The most striking seems to be the absence of a European actor and of structural funds for TA. When aiming at a broader range of decision-making processes in Europe, the European Parliament (and STOA) are important actors in the field. To foster cross-European collaboration we need a broader range of settings for collaboration and being open for additional addressees besides the EP. Establishing stronger TA across borders depends on several factors, some of which are structural, external factors, and some are factors that the institutions involved can influence themselves.

External factors: The biggest external challenge is financing. There is a need for more structural form of financing of cross-European activities. Participation beyond single projects would help to establishing TA as a stronger source for advising European decision-making and would encourage institutions to commit themselves for a longer term. In order to acquire these funds, we envisage a European TA stakeholder, who would be present “in Europe” and whose tasks would be to (i) lobby for funds in the long run and (ii) to help European TA institutions to get funds from existing programmes for the envisaged cross-European TA in the short term. Whether this European TA stakeholder could be a stronger EPTA or a new kind of TA association is an open question. Anyhow, there is a need for an organisational push for cross-European TA.

Internal factors: Successful projects are probably the best encouragement for setting up new projects. To achieve this and to adapt to the European level, there are certain internal factors the institutions should consider on the project level. Being used to working in an interdisciplinary field, applying a wide range of methods, and involving different groups of people, TA institutions are well prepared for cooperation with different institutions and across borders. However, one area that is particularly complex at the European level is the communication and dissemination of the projects’ results. To have an impact, the addressee and potential target groups must be defined explicitly for each project. This takes time and effort, but will prove useful both during the project and when communicating the message in the end.

For many TA units and their funders, the best use of their resources has been on the national or regional level, where their main tasks and addressees are located. To overcome the tension that might occur between the national/regional and the European levels, there are several things to consider. First, if a more structural form of financing would be established, cross-European work would not take away resources dedicated to the national or regional level. Second, the exchange of knowledge that occurs in cooperation might actually save resources. If an institution has done work in a specific area, others should not be afraid to use the experience and knowledge already produced in this specific field. To participate in European networks and common projects can provide institutions with valuable knowledge.

Partners in the PACITA project have set up working groups that will explore the opportunities for establishing a European TA association. Taking a more inclusive and diverse approach is something that might help create a stronger TA community in Europe. Including institutions beyond parliamentary TA (like in the German context) will broaden the field and create a stronger basis for having an impact on decision-making on the European as well as the national/regional levels.

Having an impact on decision-making and knowledge production in Europe should be the overall goal of European TA organisations. This demands more activity by them and a strong presence in the European arena.

Notes

- 1) This paper is based on work done for the EU funded project PACITA (Parliaments and Civil Society in Technology Assessment).
- 2) For a more thorough description of the different TA institutions, see Ganzevles/van Est 2012 and Ganzevles et al. 2014, also: van Est et al. in this volume.
- 3) Including partners from EPTA and STOA that are not active partners in PACITA.
- 4) Detailed case descriptions can be found in the annex of the PACITA project deliverable D2.4 “Making cross European TA” at: http://www.pacitaproject.eu/wp-content/uploads/2014/11/PACITA-D-2-4_Cross-European-TA_FINAL_incl-annex.pdf (download 15.12.14).
- 5) ETAG is led by ITAS and consists of the following partners: DBT, Rathenau Institute, Fraunhofer ISI, FCRI, ITA, VITO, Technology Centre ASCR and Responsible Technology SAS (<http://www.itas.kit.edu/english/etag.php>).
- 6) DESSI: Decision Support System for Security Decisions. The DESSI project provides a process and a decision support system to end

users of security investments. The system gives insight into the pros and cons of specific security investments. It contributes to a transparent and participatory decision-making that accounts for context and multi-dimensionality of society (<http://securitydecisions.org/>).

- 7) SurPRISE: Surveillance, Privacy and Security: A large scale participatory assessment of criteria and factors determining acceptability and acceptance of security technologies in Europe (<http://surprise-project.eu/>).
- 8) PACITA: Parliaments and Civil Society in Technology Assessment: Broadening the knowledge base in policy making. PACITA is a four-year EU financed project under FP7 aimed at increasing the capacity and enhancing the institutional foundation for knowledge-based policy-making on issues involving science, technology and innovation, mainly based upon the diversity of practices in Parliamentary Technology Assessment (PTA) (<http://www.pacitaproject.eu/>).

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