

The Shape of Global Technology Assessment



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1 Introduction

Technology assessment (TA) has a history that shows constant progress. In the last fifty years, since its initial conceptualisation as a strictly technocratic policy advisory, it has developed many different forms and shapes, while significantly expanding its aims and outreach. It is fair to say that in the last three decades TA has increasingly become more accessible to the non-expert world and has even created a unique relationship with the public. This development is on par with similar transformations in our societies that have resulted in publics that are more open, inclusive and aware of

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their power in influencing policymaking. Furthermore, TA has reaffirmed its relationship to social transformation regarding the realities of widespread socio-economic internationalisation and globalisation. It quickly accepted the fact that multilateralism is evident in every aspect of our lives and that the perception of global challenges is key in any Science, Technology and Innovation (STI) debate around the world. Thus, TA advanced its global outreach by developing the notion of global TA, which represents an inevitable development in its history.

This book is one of the many steps that are needed to develop a brand of TA that is truly global; in other words, a type of TA that can focus on global problems and be implemented in most national or cultural contexts equally well. This is a very high aspiration for TA, but one that is worthwhile pursuing. The European Parliamentary Technology Assessment network¹ (EPTA) and the Network Technology Assessment² (NTA), have been the first successful attempts to create a fully functional multicultural TA. Based on their successes, and coupled with the experience of many fruitful bilateral TA projects across the globe, the globalTA³ Network came into existence. At present, the globalTA Network has thirty members, representing all five continents and a rich variety of TA activities in every field of STI. The creation of these multilateral networks certainly shows a strong impetus in the TA community to achieve a global outreach.

This book has provided a number of narratives that argue for the future of global TA. The juggernaut of globalisation and the STI interdependences that have been created as a result, already postulate a realistic argument for the development of global TA (see Hennen and van Est, this volume). The recent pandemic crisis was a rude reminder of the urgency of the undertaking (see Monteiro et al., this volume), while the demands of publics around the world for a viable STI create the need to design a careful approach for a viable result (See van Est and Hennen, this volume).

Overall, we find no doubt that TA is crucial in the resolution of global challenges as described in the Sustainable Development Goals (SDG) (see Ladikas and Stamm, this volume), promoting international development (see Srinivas and van Est, this volume), and regulating technologies with global outreach (see van Baalen et al. as well as, Huang and Peissl, this volume). The questions that have been raised in these narratives are: How to attain a viable global TA? What is the most effective, and most realistic, route to develop it? How to achieve widespread acceptance of TA tools in very different socio-economic and political contexts? And, how to account for a fair collaboration among economically unequal partners?

¹ See <https://eptanetwork.org>.

² See <https://www.openta.net/netzwerk-ta>.

³ See <https://globalta.technology-assessment.info>.

2 The Institutionalisation of TA

Behind these questions is an issue that has occupied the TA community since its beginning in the 1960s: the question of modes of institutionalising TA practises, and setting up appropriate designs of TA institutions.

Any public debate or controversy on the pros and cons, the opportunities and risks, or the ethical implications of implementing and applying technological innovations can be understood as an informal process of technology assessment (Rip et al., 1995). It involves researchers and companies promoting the adoption of their innovations by highlighting their achievements and practical or economic advantages. At the same time, it involves various interest groups and affected communities, which in one way or the other are legitimatised and enabled to intervene with regulations and funding, and address their demands and concerns directly to policymakers. Finally, it involves experts with different scientific backgrounds who are drawn by different actors to support their own points of view. The opposite structure is also true: any official process or project of technology assessment can be understood as formalised technology controversies that involve all the above actors in a procedure controlled by a TA institution (Hennen, 1999; Hennen & Ladikas, 2019).

The need for and the modes of institutionalisation have been an issue of debate and practical experiments right from the initial discussions about TA as a specific concept (Sanz-Menendez & Cruz-Castro, 2004). The origins of TA are related to the 1960s debates on the perceived deficit of politics to steer technological change and intervene in controversies in a meaningful way that is based on reliable knowledge.

Thus, the most relevant, and up to now persisting, question about TA institutionalisation, has been how to relate science to policymaking in a way that avoids both over-ruling politics with technocratic expertise and the instrumentalization of science by politics. To date, many different models of independent scientific TA advice have been developed at regional, national and international policymaking levels (whether at government ministries or parliaments), all concerned with providing independent advice as well as relevance of expertise for the practical purposes and needs of policymaking (Enzing et al., 2012; Hennen & Ladikas, 2009; van Est et al., 2015; Vig & Paschen, 2000).

The second salient problem to be translated into institutionalised practises gained relevance during the 1980s: How to have a meaningful and equal representation of the interests and values of societal groups and stakeholders in TA processes? This has led to the development of a broad set of participatory methods applied by TA institutions, and a slight readjustment of the missions of those institutions, by adding the task of public engagement and public involvement to the more closed modes of interaction between scientists and policymakers (see, e.g. Joss & Bellucci, 2002). TA here has been part of the “participatory turn” in the 1980s that have been attested to S&T policymaking in general (Jasanoff, 2007).

A third relevant problem, that must always be addressed and fostered via institutional means, is the provision of access to the necessary expertise to address policy

problems with reliable scientific knowledge. Here, the perceived need for reflexivity has been part of TA's *raison d'être*. Uncertainties of scientific knowledge with regard to practical and deeply political problems must be dealt with, and unavoidable conflicts of expertise have to be taken into account. Interdisciplinarity and transdisciplinarity make up the necessary working mode of TA institutions. This translates into relevant staff recruitment as well as the development of procedures to broaden the scope of expertise in TA projects via regular exchanges with the scientific community (also including non-scientific expertise from stakeholders).

All this has led to different “models” of institutionalisation of TA, with different mixes of their academic/scientific, political and public “legs”—i.e. different definitions of the role of public, political, and scientific actors within the TA process (for a discussion regarding parliamentary TA institutions see Van Est, 2019). A description of the development of the debates on these dimensions of institutionalisation is beyond the focus of this chapter. It is however clear that entering into debates about how to organise TA on a global level will necessarily lead to thinking about models of institutionalisation that answer the question relating to politics, the public and science, in productive ways.

The state of TA activities and their institutionalisation differs greatly across the world. As found in this book (Hahn et al., this volume) and in the individual Country Reports (see Supplement section, this volume), especially outside of the established European TA context, developments and initiatives show a wide range of modes of institutionalisation of TA-like activities. In broad terms, these can be localised according to politics, science, and public, showing the different emphasis of country activities. Networks, TA agencies and offices, as well as academic departments provide the spaces for TA-like efforts and frame these accordingly. Yet despite this heterogeneity, the core of TA is visible throughout the different national contexts: assessments of potential risks of emerging technologies, moving towards more responsibility in research and development, addressing issues of public trust and acceptance as well as STI governance. Furthermore, similarities can be found regarding which technologies are the centre of attention: AI, digitalisation, health- or biotechnologies. There seem to be common challenges accompanying these technologies, even if there are specific national systems of dealing with them.

Regarding the processes of TA institutionalisation, the Country Reports show that the realms of academia, research and science provide a fertile ground in which expertise and methodological development can grow. Capacity building through (academic) TA studies and international exchange is another important aspect regarding potential institutional representation of TA. This in turn highlights the importance of a networked and adaptable character of global TA, especially to support countries with little or precarious TA-like activities in sustainable ways. As the history of TA shows, its institutionalisation also depends on factors outside of its influence and control (e.g., political commitment and key change agents). Therefore, the long-term aim of actual institutionalisation may not be realistic in many countries, which then implies that the efforts of the globalTA Network and specific bi-or multilateral projects must be advanced.

3 Models for a Global TA

The definition of TA that permeates the book is that developed by Bütschi et al. (2004):

Technology assessment is a scientific, interactive, and communicative process that aims to contribute to the formation of public and political opinion on societal aspects of science and technology.

This definition clearly stipulates three key aspects for the development of TA: research (i.e. scientific), participation (i.e. interactive), and impact (i.e. communicative). Every approach to TA, regardless of the context in which it is to be found, should reflect these three aspects. This refers to formal structures in TA, since types of “informal TA” are also widely practised. These are practises that involve exclusively the public sphere and the public debate on STI, not focusing on scientific research, but rather on bottom-up grassroots public participation. As van Est and Hennen point out in this volume, these types of TA require further reflection about the extent to which there is an international or even global public sphere or debate.

Having this caveat in mind, we have attempted to summarise the ideas developed in this book, in a typology of global TA that can take different key forms. We suggest four possible models that TA can follow in order to achieve a global presence. Each model includes a set of challenges and opportunities, as discussed in the contributions to this book.

Model 1: Internal Globalisation of Existing National TA Capacity

This concerns countries with existing TA capacity but limited to the specific context. Like the nation-state and national public spheres, national TA has become a site of globalisation. The observable development of national TA capacities and projects being increasingly concerned with issues of global reach, can be called internal globalisation. Based on the all-affected principle, globalisation forces national TA to broaden its field of view. Internal globalisation can affect the scientific and technological developments to be studied, and the inclusion of groups world-wide which are affected by those developments.

Such a model represents perhaps the easiest and most straightforward possibility to implement a global approach to TA issues, as it can build on existing institutional infrastructures. National TA capacities increase their awareness of the global nature of issues they are dealing with and thus increase their capacities and motivation for transnational TA cooperation. The argumentation for the need for global TA details the existing interdependencies and global effects of STI developments (see Hennen et al., introductory chapter, this volume). As such, there is an inherent need to perform TA studies that go beyond the national state-of-the-art, even if they are only targeting national audiences. This might in turn necessitate input from transnational sources and implementation of methodologies at international level. This type of TA can be described as “global” in the sense that it has a global perspective. It should be noted that in the case of the European Union, the interdependencies between Members States run so deep that it is virtually impossible to perform a “national” TA study

without integrating the full aspect of multilateral governance represented by the EU, a factor reflected in the foundation of EPTA in the 1990s.

Moreover, there is clear evidence that a sizeable part of the young generation consider themselves to be citizens of the world, in a trend that is characterised as an “internal globalisation of the public sphere” (see van Est & Hennen, this volume). This trend alone would necessitate the development of a globalised national TA, simply to make it relevant to the main preoccupations of the national citizenry. Perhaps the most prominent example of such TA is the issue of climate change. It is a truly global issue that is very salient for most people around the world, and requires concerted national analysis and action. A TA study on STI-based resolutions to climate change, will inevitably be global in scope.

Model 2: Strengthening National TA Capacities Across the World

This concerns countries with weak or non-existent TA capacity. Global TA can grow by strengthening the TA capacity of developing countries across the world. Moreover, although TA has been typically developed in democratic countries, strengthening TA capacity in authoritarian states is also a route towards global TA.

This model represents an implicit acceptance of deep structural differences between developed and developing countries in terms of STI development and public debates on related issues. Such a view should be taken with caution; although we can see clear gaps in STI education and output (see Ladikas and Stamm, this volume), we tend to overlook the potential of distinctive systems of local STI development and debate such as those involved in “frugal innovation” (see Srinivas and van Est, this volume). It is therefore advisable to approach the issue of capacity building from a mutual-learning perspective. There is no doubt that many (but not all) developed countries have considerable experience in TA implementation, covering the whole spectrum of methodologies, from the standard expert-based analysis to fully participatory scrutiny. There is scope in providing information and training to countries that do not have such experiences, in addition to providing advice on the possible institutional location of TA. On the other hand, the typical TA in industrialised countries is not geared to incorporating parameters that describe developing country constraints. For instance, severe funding restrictions, policy dependencies from external actors, or the role of international organisations and expert expatriate communities, are not normally accounted for in TA. Such an expansion would require “reverse” capacity building from developing to developed countries.

Another aspect that this model brings to the fore is that of political system differences amongst the various TA collaborating countries. This is an issue that has been discussed extensively within global TA (see Hahn & Ladikas, 2019). A short answer would argue for prescribed limitations on how “non-democratic” the country requesting the implementation of TA is. What has been called the “TA Habitat” is a vital feature for the development of any type of TA (Hennen & Nierling, 2015). It is without doubt true that the concept of TA as it developed in the Western world “has politics”, in the sense that its mission and self-understanding is closely tied to the democratic values of scientific independence and open and inclusive public deliberation of policy issues (Hennen & Ladikas, 2019). This encompasses the necessary

preconditions for the implementation of TA, one of which is the possibility for an open dialogue on STI issues. Regardless of the perceptions that exist for any regime around the world, if it allows for a public dialogue, then TA can in principle grow in it. Restrictions on the dialogue might exist, and they might even be related to the standard norms of behaviour in the country (e.g. strong hierarchies), but as long as they allow for the expression of honest views on the subject, they can be acceptable. As such, the political limitations for the development of TA are demarcated, in the sense that TA would at least develop niches of open debates within the public sphere.

Model 3: Institutional Networks Across Borders

To stimulate the internationalisation of TA, existing national TA institutes may collaborate across borders on various TA-related topics. This so-called Institutional Network option aims to establish an expert-and-participatory TA capability by connecting an appropriate set of independent, non-partisan and non-profit organisations into an international network. Examples of existing networks are EPTA and the globalTA Network. Cooperation between institutes may vary from bilateral cooperation to cooperation on a global scale, like for example in the World Wide Views on Global Warming⁴ (WWViews) project.

This model represents the existing “status quo” of global TA. EPTA is a loose network of established parliamentary TA institutes, mainly from Europe but recently also accepting non-European countries as associated members to the network. It functions as an information exchange, by e.g. providing a searchable database with TA reports developed by members, and also organizes an annual conference for members, under the auspices of a rotating presidency of the network. EPTA is therefore a good example of how similar TA institutes can form an international network, but this does not translate into common projects or standardisation of TA approaches. So far, there has been only a limited number of TA projects under the auspices of EPTA, since the network does not have its own research funds. However there have been many European TA projects in recent decades (mainly funded by the European Commission) which would not have been established without the strong ties of exchange that have been developed in the EPTA network (EuropTA, TAMI, GEST, PACITA).⁵

A similar structure is to be found in the globalTA Network. It is also a loose network of TA institutes, with the difference that it intentionally covers the whole world. It also requires that members formally accept a mission statement that clearly describes TA as⁶:

- dealing with technology and socio-technical developments
- interdisciplinary and multi-perspective
- policy-oriented (targeting political and societal addressees) and problem-oriented (addressing real-world issues)

⁴ See <http://wwviews.org>.

⁵ See <https://eptanetwork.org/database/projects?start=0>.

⁶ For details, see <https://globalta.technology-assessment.info/about-us>.

- neutral and independent (non-partisan, not funded by interest groups).

The mission statement also describes the aims of the network and the obligations of its members. This represents a step towards the creation of a permanent structure of engagement in the area of TA, but is still far from achieving it. As with EPTA, the globalTA Network does not have its own funds to initiate TA projects at global level, and it does not have a legal entity to apply for funds. There is no doubt that the achievement of global TA via such networks will necessitate these steps. But one should not underestimate the impact that EPTA and the globalTA network have on promoting TA on the international stage. Without the existence of such international networks, TA would not normally have the chance to transform its functions from the national to the international level of analysis and policy advisory.

Model 4: Global TA Linked to a Global Decision-Making Body

National parliamentary TA organisations are often linked to a decision-making body, like the parliament. This decision-making body option can also be implemented on the global level, in particular with regard to UN institutes. In the field of global warming, the IPCC is an example of this model.

This model of global TA represents a truly global structure with a global outreach. It is the most ambitious of the four models and also the most challenging. We have seen throughout this book that TA linked to a global decision-making body is not an uncommon vision for the future of global TA. Two chapters have specifically used the example of the IPCC as a case study for global TA (see Ashworth and Clarke, Ladikas and Stamm, this volume). There are very good reasons for approaching a possible structure of global TA from this perspective. Global TA deals with global STI challenges and it is natural that it should be located as a global decision-making body. But simultaneously, TA practitioners should represent as many countries as possible in order to allow for a fair and globally effective strategy or intervention. It is hard to think of any other institutional structure that accommodates global representation than the typical UN paradigm.

The challenges identified for such a possibility are many and significant. One that is shared with any other institutional TA arrangement across the world, is its relationship to policymaking. We are witnessing a great variety of policy locations in existing TA institutions, from internal bureaus in the national legislative branch that are run by policymakers and funded directly by public funds, to external STI advisories that are self-regulated and self-funded. There are major pros and cons associated with each institutional location, which have been extensively discussed (Decker & Ladikas, 2004). IPCC's location is to be found between the two sides, whereby the strategy and funding are a combination of governmental needs and scientific self-regulation. An institution performing global TA could not be differently located than IPCC. TA is by definition a consultative process to the policy making but should also have certain freedom of action in order to provide independent analysis and advice. Such freedom of action is not found elsewhere in the typical UN institutional system. As such, IPCC offers indeed a pragmatic possibility.

Another challenge is to be found in the scientific representation of a global decision-making body. Here, a global TA would be faced with the inevitable imbalance that exists between developed and developing countries in terms of scientific education and output. A TA that is based on concrete peer-reviewed science is a TA that would take the bulk of its input from very specific STI-intensive economies. There are ways to influence this input imbalance, from activating expatriate scientific communities to funding specific projects in countries with weak STI systems. These are long-term processes that cannot be effective in creating immediate input, but only a global institutional arrangement can deal with such challenges in the long term.

Furthermore, a main challenge for such a model would be the manner in which TA methodologies are implemented in different cultural contexts. This refers mainly to participatory and interactive methods that are well-established in most Western countries but have not yet been tried extensively in other cultures. Although it is clear that public debates on STI issues are evident across the globe (see van Est & Hennen, this volume), it is far from clear that participatory methodologies can be applied equally well in every country. Cultural specificities, norms of behaviour and political context, are some key elements that global TA must take into consideration. This is particularly important for a TA that is closely located to a centralised global decision-making structure. If TA is to provide the ground for consensual decision-making, everyone must be content with the way it is applied in their national context. This is a challenge, but also a unique opportunity to initiate global debates which are both based on and promote global citizenship. Some of the (little) experience that TA has accumulated in this area (see World Wide Views, above) is very promising for the potential of globally implemented participatory methodologies.

4 Next Steps for the GlobalTA Network

Having discussed the various models that the global TA could follow, we provide some insights as to the development of the network itself. Irrespective of the manner in which TA can embrace multilateralism, there are certain steps inherent in its development. Notwithstanding the achievement of having created a global network, the next steps should involve:

The development of global projects; the practise of global TA can only be attained by actually running TA projects which encompass at least the majority of the Network membership. This means agreeing on common methodological approaches, timelines and frameworks for results comparison. This is a very complex and expensive process that so far has not been realised due to funding constraints. An alternative could be a more modest comparative approach, using existing institutional funds. But without this step, there can of course be no global TA approach.

Information exchange; a network is foremost a structure of information exchange. Like EPTA, that lacks extensive project implementation but offers a platform for extensive exchange of national project results, global TA could also develop

its own information exchange platforms. Although a less demanding step than the common project one above, it will still require dedicated staff for this purpose, and internal funds.

Legal institutionalisation; as we have seen, there are different ways in which TA has been institutionalised in different countries. The globalTA Network will require a legal entity if it is to develop in a coherent TA practise group. This is far from simple, as multilateral institutions require backing by national authorities in order to become legal entities. But this is necessary in order for the Network to acquire the capacity to bid for project funds, pay staff and be represented on the global stage.

Long-term funding; this is of course another necessary aspect for the globalTA Network. One possibility is to follow the IPCC model and require an annual fee from the institutes and scientists that comprise the network. In this manner, the network can safeguard its independence and acquire a secretariat to ensure basic functions.

The role of the UN; as we have seen, UNCTAD is the UN organisation with a remit to perform TA and outreach to the whole globe. It is evident that the globalTA Network has a lot to gain by working with UNCTAD while the opposite is also true. Such mutually beneficial relationships can be formalised with a Memorandum of Understanding (MoU) that establishes a working relationship whereby the network can run TA projects on behalf of UNCTAD.

Overall, there is significant potential for development in the globalTA Network. How far this development can go depends not least on the necessity to have such a network on the global STI stage. We believe that this is indeed the case. This book is another step in developing the globalTA network, as it provides the conceptual structure upon which the practise of global TA will be built. It is now time to make the leap from theory to practise.

References

- Bütschi, D., Carius, R., Decker, M., Gram, S., Grunwald, A., Machleidt, P., van Steyaert, S., & Est, R. (2004). The practice of TA; science, interaction, and communication. In M. Decker, M. Ladikas, S. Stephan, & F. Wütscher (Eds.), *Bridges between science, society and policy* (pp. 13–55). Springer.
- Decker, M., & Ladikas, M. (Eds.). (2004). *Bridges between science, society and policy; technology assessment—Methods and impacts*. Springer. <https://doi.org/10.1007/978-3-662-06171-8>
- Enzing, C., Deuten, J., Rijnders-Nagle, M., & van Til, J. (2012). *Technology across borders. Exploring perspectives for pan-European parliamentary technology assessment*. European Parliament.
- Hahn, J., & Ladikas, M. (Eds.). (2019). *Constructing a global technology assessment. Insights from Australia, China, Europe, Germany, India and Russia*. KIT Scientific Publishing.
- Hennen, L. (1999). Participatory technology assessment: A response to technical modernity? *Science and Public Policy*, 26(5), 303–312.
- Hennen, L., & Ladikas, M. (2019). European concepts and practices of technology assessment. In J. Hahn & M. Ladikas (Eds.), *Constructing a global technology assessment* (pp. 47–78). KIT Scientific Publishing.

- Hennen, L., & Nierling, L. (2015). A next wave of technology assessment? Barriers and opportunities for establishing TA in seven European countries. *Science and Public Policy*, 42(1), 44–58. <https://doi.org/10.1093/scipol/scu020>
- Hennen, L., & Ladikas, M. (2009). Embedding society in European science and technology policy advice. In M. Ladikas (Ed.), *Embedding society in science and technology policy: European and Chinese perspectives* (pp. 39–64). European Commission.
- Jasanoff, S. (2007). *Designs on nature. Science and democracy in Europe and the United States*. University Press.
- Joss, S., & Bellucci, S. (Eds.). (2002). *Participatory technology assessment: European perspectives*. The Athenaeum Press.
- Rip, A., Misa, T. J., & Schot, J. (Eds.). (1995). *Managing technology in society: The approach of constructive technology assessment*. Pinter.
- Sanz-Menendez, L., & Cruz-Castro, L. (2004). Shaping the impact: The institutional context of parliamentary technology assessment. In M. Decker, M. Ladikas, S. Stephan, & F. Wütscher (Eds.), *Bridges between science, society and policy* (pp. 101–129). Springer.
- Van Est, R. (2019). Thinking parliamentary technology assessment politically: Exploring the link between democratic policy making and parliamentary TA. *Technological Forecasting and Social Change*, 139, 48–56.
- Van Est, R., Ganzevlees, J., & Nentwich, M. (2015). Modelling TA in relational terms. *TATuP – Zeitschrift für Technikfolgenabschätzung in Theorie und Praxis*, 24(1), 11–19.
- Vig, N. J., & Paschen, H. (Eds.). (2000). *Parliaments and technology*. State University of New York Press.

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