# Technology Assessment in Austria—State of the Art and Research Activity of the ITA[1]

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## Abstract

The scientific concept of Technology Assessment (TA) is more than 30 years old. It roots in discussions conducted in the United States in the early 1970s in which US parliamentarians, who were responsible for the allocation of huge investments to technology programmes, looked for impartial scientific advice. They felt unease about the specific situation between government and its think tanks on the one hand and parliamentary level political decision makers on the other hand, who worked without scientific advice. This led to the establishment of the Office of Technology Assessment (OTA), the 'mother' of all classical TA institutions. But kids never copy their mothers. Sometimes, however, the way 'kids' develop is strongly influenced by their mothers. So it was with TA, for which the last 30 years have brought some very differentiated development, especially so in Europe.

TA is the attempt to gain insight into the future relationship between science and technology and society. Technology Assessment is both an interdisciplinary scientific concept and an advisory instrument for technology policy makers. The efficiency of different TA bodies in different countries is therefore highly dependent on the political system and the context in which TA is implemented. This is why this paper aspires to provide an overview of different TA concepts. Furthermore it will compare methods and approaches of the Institute of Technology Assessment of the Austrian Academy of Sciences with those of other institutions in Europe.

## The development of technology assessment in Austria

Since 1978, when the majority of Austrian citizens voted to reject the newly built nuclear power station at Zwentendorf in a plebiscite, it has been clear that such expensive errors should be avoided, using systematic analyses and a proactive technology policy. The second catalytic issue revolved around a large-scale hydroelectric power project planned for the River Danube at Hainburg east of Vienna. A major struggle arose between government, industry and the trade unions on the one side and a largely

young, environmentally conscious group of people on the other, a group that was to succeed in the endeavour of providing protection for one of the last unspoilt river forest landscapes along the Danube. This struggle made clear that the 'social partners' have a much shorter time horizon for their aims than the ecological movement. It also showed that the 'social partners' could no longer represent the entire population, bringing a crisis for this powerfully entrenched and established system (Peissl 1996).

In Austria, Technology Assessment (TA) was brought into discussion later than in other European countries. In 1980, there was a symposium entitled 'Technology and Society' which could be regarded as a starting point. However, the catalytic event was provided by a symposium in 1984, when Heinz Fischer, the former Minister of Science and Research, formally addressed, for the first time, the demand for an institution like the OTA in Austria (BMWF 1984: 5).

Later in 1985, a small TA working group was established within the Austrian Academy of Sciences at the Institute for Socio-Economic Research, which later changed its name to 'Institute for Socio-Economic Research and Technology Assessment'. In 1988, the 'Technology Assessment Unit (TAU)' evolved from this institute. TAU was evaluated in 1993 and renamed Institute of Technology Assessment (ITA) on 1 January 1994.

The reason for implementing TA within the organisational framework of the Austrian Academy of Sciences (AAS) may be found in its excellent scientific reputation and impartial standing.

The Austrian Academy of Sciences is a legal entity under the special protection of the Federal Republic of Austria. According to the statutes of the Academy, its mission is to promote the sciences and humanities in every respect and in every field, particularly in basic research. The Austrian Academy of Sciences is funded by discretionary loans granted by the Federal Ministry of Education, Science and Culture. Additional funds are obtained from third parties, particularly through research contracts. Founded in 1847, the Austrian Academy of Sciences has developed from a science community into a support organisation for modern research institutions (AAS 2001).

## The Institute of Technology Assessment of the Austrian Academy of Sciences (ITA)

The Institute of Technology Assessment of the Austrian Academy of Sciences was founded at the instigation of the Federal Ministry of Science and Research, with the help of a start-up subsidy granted by this Ministry, to help create an institution dealing with Technology Assessment in Austria. Accordingly, ITA sees its role in providing advisory services on technology policy, as well as in evaluating technologies to provide early warning of newly arising problems. The process involves listing important facts and consequences, identifying fields of consensus and diverging opinions, as well as uncovering the reasons, and finally, by the collation of existing or newly acquired knowledge, pointing out possible courses of political action. At present, the institute employs eleven scientific staff members.

In keeping with TA's interdisciplinary nature, staff members have varying backgrounds such as economics, business sciences, sociology, political sciences, communications research, law, telecommunications, chemistry, ecology, molecular biology, and medicine. The permanent staff forms the nucleus of the interdisciplinary team around which specialists from other fields are grouped on a case by case basis, as required.

ITA's historically developed research areas are information and telecommunications technologies, biotechnology, health technology assessment, environmentally sound technologies, and basic concepts and methodology of TA. Within the ICT research area, ITA studies transformation processes in the areas of public administration, academia and the services sector. It investigates usage and diffusion factors, new forms of work organisation and convergence and regulatory aspects of telecommunications and the Internet. Recently, special focus has been given to IT security and the protection of privacy in the so-called 'Information Society'. The Health Technology Assessment group investigates the effectiveness of medical interventions and their economic and organisational implications. Technologies under consideration are information technologies, genetic diagnostics, technologies for the elderly, and various new medical practices. In the biotechnology field, ITA aims to find criteria for a release and regulatory framework for genetically modified organisms and prod-

ucts; it performs comparative analyses of public perception and policy in the area of gene technology in Austria and Europe and analyses the societal conflicts triggered by technologies in general. Studies on environmental technologies analyse the concepts of sustainability and environmental policy with a focus on hindrances and driving forces for the development and use of preventive environmental and sustainable technologies. As the key institution in Austria specialising in TA, ITA also serves as the central node in a network, its responsibilities including looking after the TA database, producing a TA newsletter, organising conferences, observing new methods and TA research units internationally as well as producing technology foresight (see ITA 2000).

## Concepts and approaches

In accordance with its primary aim of being an advisory instrument for technology policy, Technology Assessment needs to be addressee-oriented. In the beginning, there were great and inspiring visions of comprehensiveness. TA studies were to cover all aspects of technology usage. The lapse of time showed, however, that comprehensive TA studies making a consistent attempt to cover all aspects of the field are costly and very time consuming. Furthermore they could not deliver the level of certainty about the future that decision makers wanted. This is why TA developed more and more towards specially tailored and focused 'partial' TA studies.

Although there is no clearly defined method for doing TA, we know a quite reasonable and frequently applied TA procedure scheme already from one of the earliest books on TA (Porter 1980). These components of classical TA study serve as a guide through the entire process, starting with problem definition. After that the technology at stake requires description and some appraisal of its future development. The same has to be done for the societal context in which the technology, the technological system, is supposed to be implemented. After having created a picture of the technology and its societal setting, the core element of any assessment is based on the identification, analysis and assessment of pos-

sible impacts. As soon as something has been learnt about possible impacts, political options are analysed and recommendations written. At the end of the process, the results of the study need to be communicated. Ideally, before proceeding to this next stage, the whole assessment should be rethought under the presumption that at least some of the given recommendations will be accepted and put into practice.

The following illustration gives a sketch of the classic TA study procedure:

**Figure 1.**
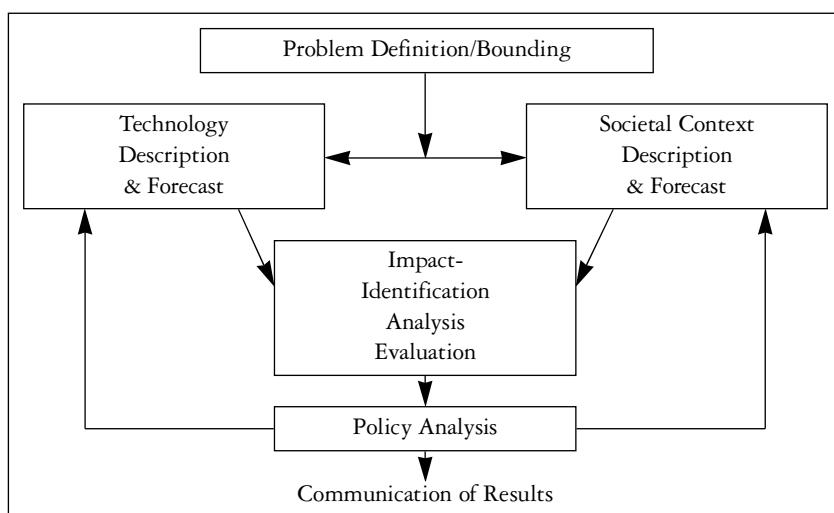


Starting from the 'classic' TA concept of the OTA (Office of Technology Assessment), there was a discussion in Europe on how to implement TA under the specific framework of European political systems. European political systems differ quite strongly from the US presidential system; therefore it was quite obvious that new forms of institutionalisation would establish themselves in Europe even though the OTA was considered the paragon of TA.

In the following, we will briefly discuss some approaches or models of European TA.

*The classic TA model*
The classic TA model is characterised by a strong expert focus combined with high in-house expertise and institutionalisation at or at least in proximity to the parliament. Classic TA studies aspire to achieve a high degree of comprehensiveness and try to sketch a broad picture of the possible future. To gain better insight, they often consider stakeholder involvement a factor in the TA process. The main results are options for decision makers presented in reports. The OTA and to some extent the ITA represent this model.

*TA secretariat*
The so-called TA secretariat is situated at or in proximity to the parliament and works for legislative bodies as well as for executive bodies. It is generally well established in the scientific community and handles most of the TA processes, mostly by subcontracting. This means the TA secretariats design TA projects, define the research questions and look for scientific institutions to perform the actual studies. In the end, the TA secretariat is engaged in the integration of different detail studies and the writing of options and recommendations. TA secretariats often see their goal in the organisation and coordination of TA processes. Typical examples are the German TAB, the Dutch Rathenau Instituut, the British POST, the Swiss TA Centre and the French OPECST.

*The participatory model*
The participatory model was first employed by Teknologi Rådet in Denmark. This is an institution with proximity to the parliament and some formal links, but also possessing a high degree of independence. Such models do only a small amount of in-house research. Their primary aim is to moderate public technology debate. They are greatly committed to applying and developing methods of layman participation in the TA processes.

From a historical perspective, the classic, expert-oriented model seems to be losing significance vis-à-vis the participative model of TA.[2] As said before, TA is situated at the borderline between science and poli-

tics. It needs scientific TA institutes to prepare scientific basic material in an interdisciplinary manner and in the most comprehensive manner possible. These TA institutes are mostly found in universities and other academic frameworks. To some extent, the ITA may be thought of as working this way. Many other institutions in Europe are smaller entities that fulfil their tasks in quite a different way. The so-called TA secretariats commission studies and restrict themselves to the study design phase, the integration of detail studies and policy advice. PTA institutions are in close proximity to the parliament. They are often commissioned directly by parliamentary committees. To be able to respond to parliamentary requests in time they are frequently organised in the manner of TA secretariats.

The following illustration shows the different degrees of institutionalisation in a combined form:

**Figure 2.**
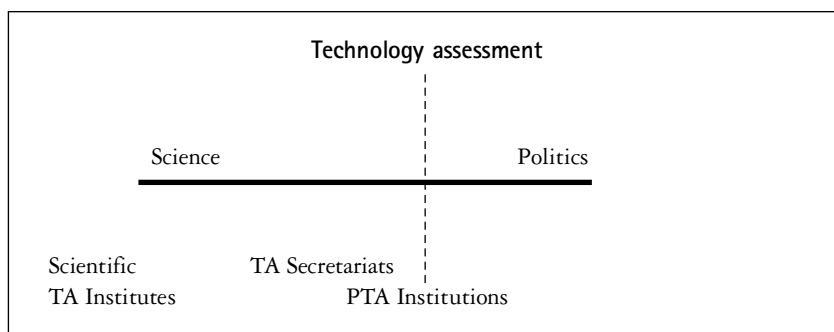


## International institutionalisation of TA

Many European countries have 'official' TA institutions; most of them act for their national parliaments. In 1990, a network (European Parliamentary Technology Assessment—EPTA) was formally established for the furtherance of PTA centre products and experiences. The members of the EPTA network are bodies performing science and tech-

nology assessment (TA) studies in order to advise parliaments on the possible social, economic and environmental impact of new sciences and technologies. Such work, pioneered in the 1970s by the Office of Technology Assessment (OTA) of the US Congress, is considered an aid to the democratic control of scientific and technological innovations. The EPTA Network is now drawing increased interest from new and prospective PTA groups in EU and EAA countries. The participating institutions are constitutionally and methodologically heterogeneous, but share a concern for providing impartial and high quality accounts and development reports on issues such as bioethics and biotechnology, public health, environment and energy, industrial and R&D policy. The Network has a lean structure, guided by the EPTA Council, composed of members of parliament, and by meetings of the Directors of the EPTA Partner Organisations (POs). EPTA members are: the European Parliament, Denmark, Finland, France, Germany, Greece, Italy, Netherlands and the United Kingdom. EPTA aims to advance the establishment of Technology Assessment as an integral part of policy consulting in parliamentary decision-making processes in Europe and to strengthen the links between TA units in Europe. To this purpose, salient national TA units from European countries which are not (yet) members of the European Union, or salient TA units from EU member countries with only informal connections to national parliaments are involved in the EPTA Network as associates. Associates are involved in all EPTA activities but are not represented in the EPTA Council. Associates are the Council of Europe, Austria, Belgium, the Czech Republic, Norway and Switzerland (see EPTA 2000).

The following Table 1 gives an overview of EPTA founding members and their financial and personnel resources. Additionally, it lists some 'typical' methods. This does not mean that these methods are the only ones used. Rather, these are methods the respective institution is known for.

Based on the analysis of the different approaches and 'typical' methods, these institutions can be placed in a system of coordinates. Criteria for ranking in the following illustration (Figure 3) are the length of the information reports presented and the level of expert orientation.

## Table 1. EPTA – European Parliamentary Technology Assessment

| Institution* | TAB | Rathenau Instituut | Teknologi Rådet | STOA | OPECST | POST |
|---|---|---|---|---|---|---|
| Budget 1997 in m | 1.8 | 1.7 | 1.5 | 0.75 | 0.8 | 0.4 |
| Scientific staff | 9 | 11 | 7 | 6 | 11 | 4 |
| 'Typical' methods | Reports Newsletter Workshops | Reports Workshops Briefing notes to the Parliament | Partici-patory TA | Reports Newsletter Workshops | Strong involve-ment of parliamen-tarians 'Pol. reports' | Briefing notes |

Budget and staff figures taken from: Vig and Paschen (2000: 12).

  **\*TAB** = Technikfolgen-Abschätzungsbüro des Deutschen Bundestages (Berlin)
  **Rathenau Instituut**  = Dutch Institution (DenHaaag)
  **Teknologi Rådet**  = Danish Board of Technology (Kopenhagen)
  **STOA** = Scientific and Technological Options Assessment (European Parliament)
  **OPECST** = Office Parlementaire d'Evaluation des Choix Scientifiques et Tech-nologiques (Paris)
  **POST** = Parliamentary Office of Science and Technology (London).

## Figure 3.
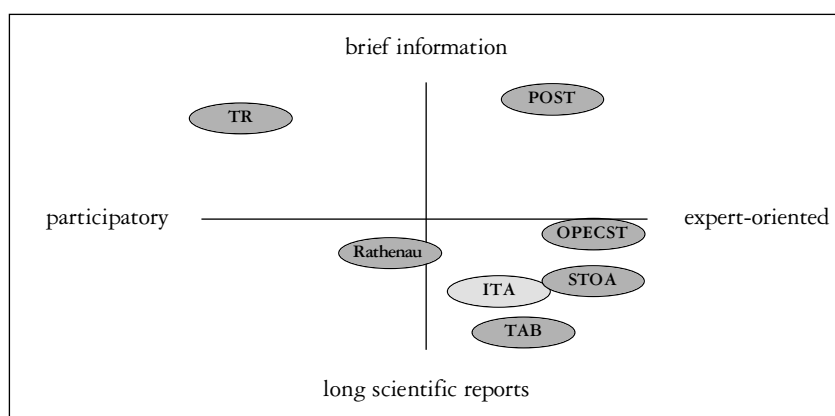


(See: Peissl 1997: 310; Peissl 1999).

## Problems of TA and outlook

After deliberating the various forms of institutionalisation and the different approaches used, I wish to conclude by discussing some problems of TA.

One of the fundamental problems of TA is timing. If, on the one hand, a TA process is instigated too early in the life cycle of a technology development, only little and poor information will be available. Therefore its results can hardly be used as a strong directing sign. On the other hand, if the TA process is too late, huge sums of money have already been invested, inherent necessities have arisen and the margin for interference has become rather small. Hence, the TA performing institution has to develop a 'feeling' for identifying the right point in time. Therefore technology monitoring, i.e. scanning the international scene for emerging technologies is an integral part of TA. By identifying technological trends rather early it is possible to initiate studies in due time.

Other problems of TA may be the restricted possibility of directly influencing technological developments as well as political processes. To an increasing degree, technological developments take place within the private sector and hence cannot be greatly influenced by politics. Politics, in turn, rely on a logic other than pure scientific argument.

Although TA is supposed to address political decision makers, it is ever more necessary to address the public, too. TA has until now appeared to suffer from a public recognition deficit. One reason for this may be the expert-oriented way of thinking prevalent in many TA institutions and therefore, a lack of public relations activities for their own products. At the same time, there seems to be a rather difficult societal situation for TA. The so-called 'Zeitgeist' (spirit of the age)—realised in market orientation, deregulation, globalisation and neo-liberal economic concepts does not see any value in societal or political 'control'—no matter how indirect and weak it may be.

Aside from the societal attitudes endorsing the influencing of technological developments, there are internal problems that must be faced by scientists involved in TA. Firstly, it takes a long period of individual and institutional learning to really establish a TA performing body. Inter-

national comparisons (Falkner 1994) show that an institutionalisation time period of 8 to 10 years is needed before TA bodies are given credit for their work. Working on the interface between science and politics, it is necessary to manage two different 'logics'. The precise, accurate and time-consuming method of analysing things in science on the one hand, and the need of politics (and especially politicians) to get answers almost immediately on the other. Hence, it takes time to learn which questions are relevant and which may be dealt with positively with the resources available.

Finally there is a problem for TA in the academic culture. We have learned and are used to thinking in specialised disciplines and it is hard to cross the borders between them. Hence, an interdisciplinary approach such as that of TA forces the actors involved to learn to talk to others, listen to others and to express themselves in a way others are able to understand. This again takes time …

Even though the arguments given above may appear sceptical, I believe performing TA in a useful way is possible and furthermore that it is necessary to establish TA bodies on different levels of decision making. International developments in TA show a great deal of openness to new forms of TA processes. We will never waive scientific approaches. We need them to gather information and build an impartial information basis. But it seems that the future of TA will bring a higher degree of layman participation and different participatory methods. TA body tasks may shift somewhat, towards the coordination of TA processes and the stimulation of public technology debate. Whatever the future brings, responsible decision makers (and the public) will be called on to try to influence the design of new technologies in a socially acceptable manner. And TA may help in this task.

## Notes

1    This paper is based on a lecture given on 16 May 2001 at the Institute for Advanced Studies on Science, Technology and Society, Graz, Austria.

2    For a short but very informative survey on the history of TA concepts see Meyer 1999.

# References

AAS (2001), *The Austrian Academy of Sciences*, http://www.oeaw.ac.at/english/about/fakten/fakten.html (25 December 2001).

BMWF (1984), Nationalfeiertagssymposium 1984, Wien.

EPTA (2000), *Homepage of EPTA, About EPTA*, (Homepage, 2001) http://www.eptanetwork.org/epta/index.php3.

Falkner, G., W. Peissl and H. Torgersen (1994), *Parlamentarische Technikfolgen-Abschätzung in Europa*, Wien: Institut für Technikfolgen-Abschätzung der Österreichischen Akademie der Wissenschaften.

ITA (2000), *Research Areas*, http://www.oeaw.ac.at/ita/e1-2.htm (25 December 2001).

Meyer, R. (1999), 'Eine kurze Geschichte der TA-Konzepte', *TAB-Brief* 17 (December 1999): 4–11.

Peissl, W. (1996), 'Technology Assessment in Austria—A Tentative Attempt', *International Journal of Technology Management—Special Publication on Technology Assessment*: 604–612.

Peissl, W. (1997), 'Das Institut für Technikfolgen-Abschätzung der Österreichischen Akademie der Wissenschaften', in R.G. v. Westphalen (Ed.), *Technikfolgenabschätzung als politische Aufgabe*, 3, München/Wien/Oldenbourg: 305–322.

Peissl, W. (1999), 'Parlamentarische Technikfolgen-Abschätzung in Europa', in S. Bröchler *et al.* (Eds.), *Handbuch der Technikfolgen-Abschätzung*, Vol. 2, Berlin: Edition Sigma: 469–478.

Porter, A.L., F.A. Rossini, S.R. Carpenter and A.T. Roper (1980), *A Guidebook for Technology Assessment and Impact Analysis*, New York.

Vig, N.J. and H. Paschen, (Eds.) (2000), *Parliaments and Technology*, Albany, US: State University of New York Press.