ÖAW AUSTRIAN ACADEMY OF SCIENCES

ITA INSTITUTE OF TECHNOLOGY ASSESSMENT

MEDIUM-TERM RESEARCH PROGRAMME 2018–2020

INSTITUTE OF TECHNOLOGY ASSESSMENT
OF THE AUSTRIAN ACADEMY OF SCIENCES

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1 Scientific technology assessment

Over the past decades, technological development and societal change have steeply increased in pace and complexity with rising implications for humanity. Technology assessment (TA) addresses these implications by investigating the consequences of and options for novel or rapidly developing technologies, from different perspectives. TA examines social, political, legal, ethical and economic as well as health and environmental dimensions of technological change. TA attends to questions of precaution, ethics, acceptance, equity, responsibility, and sustainability of technologies. Based on scientific evidence and participatory approaches it contributes to technology governance and takes an active part in the shaping of technologies to come.

scientific TA research plus public and political functions

The TA field uses a variety of methods to communicate findings to scientific peers, political decision makers, and the general public. The Institute of Technology Assessment (ITA) is devoted to both research addressing the scientific community as well as to public and political debates on controversial aspects of science and technology. The ITA contributes to problem solving in these contexts. It pursues these goals by producing academic publications, research reports, and organising media and public events which target a broad audience such as politicians, government officials, and the wider public.

the ITA's value base

When advising society and politics, the ITA is firmly grounded in the democratic values enshrined in the Austrian Constitution, including pluralism and the respect of human rights, and of policy objectives set at the national or international level, such as sustainable development and the pursuit of distributive justice and common welfare. Based on sound research, the ITA seeks to contribute to better political decisions, which starts with and goes beyond informing on the state of knowledge and the mapping of uncertain aspects of technical change. We focus on topics based on their relevance to society (see Section 2 below). We strive for neutrality with regard to stakes and interests of individual societal groups. Furthermore, we search for alternatives to the status quo and for futures advocated by stakeholders. We seek to address key issues from multiple perspectives, transparently mapping and making explicit values, interests and tacit knowledge. The extent and degree of the ITA's contribution to debates on technological change depends on the research topic (see Section 4.1 below on our reflection of our roles). We stand for transparency in all our activities, and provide open access to all our reports.

neutral and multi-perspective

drawing on a combination of approaches ...

Scientific TA relies upon theory, advanced methodologies and inter- and transdisciplinarity to generate new knowledge about technology in society. For instance, TA draws on and contributes to various disciplinary strands to gain insights into topics such as transitions in socio-technical systems, the development, diffusion and impact of novel technologies, or the dealing with missing scientific knowledge and irreducible risks. TA draws on and contributes to various disciplinary strands such as science and technology studies (STS), policy studies, sociology of technology, and innovation economics. The study of applied ethics is also of high relevance as it deals with normative questions such as how to shape technology with basic rights and public welfare in mind. In addressing implications of technological change such as risks to human health and the environment, TA also strongly builds on insights from natural and engineering sciences.

... and institutionalised inter- and transdisciplinarity

The ITA is an interdisciplinary research institute and employs researchers from the social sciences and humanities as well as the natural and engineering sciences. Our researchers have different areas of expertise from a variety of fields, and aim to address complex issues of technological change compre-

hensively and from multiple perspectives. Moreover, the ITA staff is trained to integrate stakeholder expertise as well as local and situated knowledge in all its work. In many projects, the ITA involves actors from stakeholder communities or the general public (through participatory TA). As a rule, internal project teams or research groups with external partners carry out inter- and transdisciplinary research.

In a nutshell, the ITA is devoted to *scientific TA* and, as a rule, *all* our activities have the following characteristics:

key characteristics of scientific TA at the ITA

- inter- and transdisciplinarity
- multi-perspective
- relevance for both politics and society
- based on scientific methods and findings
- impartial with regard to political and/or economic interests.

2 Addressing the salient technology topics

typical TA issues

Technological innovation is multi-faceted and TA must deal with a variety of issues, for example the opportunities and challenges associated with rapidly evolving technological fields (for instance, information and communications technologies), so-called Grand Challenges such as climate change, resource scarcity, demographic changes, – and controversial aspects of emerging technologies (such as for example products in nanotechnology, synthetic biology, and the neurosciences). TA topics include the study of relationships between societal problems and technology, and governance of emerging technologies. The interactions between technological and societal change are dynamic processes which require continuous observation, analysis and adaptation of scientific approaches addressing them.

emerging technologies and society as moving targets

TA focuses on the present and future, and occasionally uses retrospective analysis. It is of paramount importance for the ITA to keep up to date with current technological and societal developments. The ITA continuously needs to be responsive to these changes. To do so, we have the following means and sources of information at our disposal:

how we become responsive to technological and societal developments

- We identify emerging technological trends and societal problem areas at an early stage with the help of our international network of world-leading institutions in TA. Regular “horizon scanning” activities are discussed in the European Parliamentary Technology Assessment (EPTA) network of which we are part.
- We closely follow the calls of national and international funding agencies, particularly those at the EU level (such as the Horizon 2020 Programme and calls from the European Parliament’s Science and Technology Options Assessment (STOA) panel).
- We regularly carry out forward-looking activities (foresight) and monitoring studies (including media analyses) informing our clients and the TA community on TA topics. Every half year (autumn and spring) we carry out a monitoring exercise for the Austrian Parliament (together with our partner AIT) with a view to carve out the most important, politically salient TA-related topics of the near-term future.

monitoring for the Austrian Parliament

- We address requests from national public actors, such as federal ministries, the Austrian Parliament and government agencies. We raise key is-

sues to specific public actors who are in the position to feed them to policy and public debates.

horizon scanning as a key activity of ITA

- Regular internal workshops serve to discuss future issues against the background of our different disciplinary perspectives and individual professional experiences.
- To identify potential TA topics in new socio-technical developments, the ITA team performs short-term exploratory studies. The results of these short studies may serve as a basis for larger, externally funded projects.
- The ITA also supports researchers in their pursuit of academic qualifications such as PhDs and habilitations awarded by universities. Candidates choose their research topics based on their independent research interests in the broad field of TA and topics covered at the ITA.

eligibility criteria for ITA projects

Topics covered at the ITA must:

- be scientifically interesting and promise to generate new insights in the field of science, technology and society;
- be relevant in a national, European and/or global technology policy context;
- show a scientific, societal, or political urgency;
- be feasible given the expertise and resources available at the ITA and project consortium; and
- fulfil the general criteria for scientific TA (see end of Section 1).

3 Topics of TA and at the ITA

Our research agenda is guided by the following themes:

sustainable development fosters mission orientation

- In the pursuit of sustainable development technological innovation becomes highly normative and mission-oriented. Research at the ITA will primarily but not only address technology options for pressing societal problems and Grand Challenges.

the challenge of governing technosciences

- Scientific research in dynamic fields such as synthetic biology contributes to the rapid rise of scientific knowledge, and is closely linked to technology development (so-called “technosciences”). Such developments create uncertainty and challenges for governance, making them core issues in the study and practice of TA.

responsible research and innovation

- The ITA will contribute to new and emerging research and policy areas which are directly relevant for the TA field, such as “responsible research and innovation” (RRI) or, as it is called in Austria, “responsible science”. The ITA will actively contribute to this discussion through the lens of technology governance and conduct own research on the topic of RRI.

the infrastructure of the information society becoming “smart”

- Driven by social and economic uses of ICT, increasing digitalization of all areas of life and progress towards the „Internet of Things“, robotics and „artificial intelligence“ (AI), the information society will further unfold in directions and roles yet to be defined and discovered. TA becomes even more relevant as the global information and communication ecosystems grow in capacity and complexity, and become “smarter”. The ITA will continue to focus on building understanding of the implications and interactions of AI developments such as ambient intelligence, autonomous systems and machine learning, semantic computing, algorithms, and “smart” technologies with societal concerns regarding privacy, the preservation of

human autonomy and dignity, wellbeing and equality, power relations and biases.

the ITA contributes to various meta-themes

The meta-level themes guiding the research at the ITA are technology governance, technology controversies, innovation processes, social learning, technology ethics and human rights.

The ITA's planned and current projects[1] in the period 2018–2020 cover the following four areas:

information society

- In the broad research field of the information society, the ITA focuses on four topics. First, the accelerated intrusion of computer technology into the private sphere is characterised by tensions and conflicts between techno-efficiency, cyber-security, human autonomy and values such as human dignity or privacy. A further increase in automated technologies (including big data, machine learning, artificial intelligence, algorithms, and robotics) reinforce the demand for value-sensitive design (such as privacy-by-design) and according assessment of ethical and human rights issues. Second, we study how these developments can be governed with respect to fundamental rights and freedoms (e.g. informational self-determination), including transparency and accountability of public and private institutions as well as of technology development and usage. Third, we focus on networked environments and their implications on digital identities and knowledge generation. Application areas include academia (e.g. in open science and citizen science) as well as the state (the new concept of "no-stop government") and industrial production (industry 4.0). Fourth, we address the politics of information technologies. This includes the study of how norms, values and ideologies co-emerge with the development and governance of ICTs.
  Our topics until 2020 include performativity in software design, autonomous vehicles, cyber-physical systems, smart environments, assistive technologies, search-engines, critical infrastructures, implications of data brokerage, and blockchain technology.

technology and sustainability

- Our second research focus is on socio-technical developments for sustainability. Central issues include low-carbon, renewable, and highly efficient energy technologies, climate technologies, sustainable production and consumption of goods, the role of ambient assistive technologies in demographic changes and cyber agri-food systems. Future research at the ITA will address selected key technology areas as well as long-term transitions of socio-technical systems. Moreover we contribute to the development of methods to better understand and assess sustainability and sustainable innovation. Particularly, we aim for an improved understanding of local and regional as well as systemic effects of on-going developments in the enhancement of the societal value of socio-technical innovation.
  Our topics until 2020 include integrated smart city approaches, smart energy systems pilot projects, shared autonomous electrical mobility solutions, evaluation of sustainable innovations, follow-ups for forward looking studies on future food and monitoring of large-scale R&D programmes.

governance of emerging technologies

- The rapid growth of knowledge and the ongoing integration of science and technology such as in the nano-, bio-, info-, and cogno-technosciences bring about innovations as well as new uncertainties and

[1] For an up-to-date list of our projects reflecting the demand side of TA studies (cf. above chapter 2), see our online project database oeaw.ac.at/ita/en/projects/current-projects/ with usually around ten projects at any time.

controversies. Past experiences with new technologies such as biotechnology suggest that future controversies may arise for concrete applications as well as research governance. Based on sound research on some of the main controversies with regard to technological change, we explore paths towards modes of responsible governance and responsible research and innovation.
Our topics until 2020 include technosciences such as systems biology and synthetic biology, nanotechnologies and advanced materials. Conceptually, they refer to debates on converging epistemic cultures, challenges of anticipatory governance and discourse theory.

participatory approaches

- The ITA has a long tradition in conceptualising, developing and applying participatory approaches to inform policy-makers on citizens' and stakeholders' views on specific topics. Methods include citizen panels, focus groups and scenario workshops. Based on the idea of constructive TA, participatory practices also involve technology developers and regulators. On a theoretical level, we critically reflect on preconditions and consequences of the participatory turn in technology governance. Topics until 2020 include a constructive TA approach in researching and collaborating with software development teams and two European projects on societal engagement under the header of RRI.

4 Reflexive studies: Towards the theoretical and methodological advancement of TA

internally funded

broad participation of whole team

ITA projects may be initiated by our funders through calls or specialised requests, in which cases we address the requirements of the funding calls. In each medium-term period the ITA selects one or two topics for in-depth investigation supported by the institute's internal funds. These topics address meta-level theoretical questions based in particular on internal research experience, but also on empirical evidence of other TA institutions. We set up internal project teams that cover a cross-section of all competencies and thematic groups of the institute. The teams for such projects try to achieve participation of all members of the ITA in varying roles, such as members of the project teams, as advisors or participants in discussions.

addressing the scientific community

In such projects our primary audience is the scientific community. We aim to contribute to the body of methodological, theoretical and reflexive literature of TA. Furthermore, we strive for deepening our interdisciplinary practice and for collaborative learning.

The first such internal, reflexive study on "Policy advice in TA: communicational settings, actor constellations, objectives & standards" has been successfully carried out in the last period (in 2016 and 2017). We shall certainly follow up on this topic with further scientific publications throughout the next period. In 2018–2020, we will carry out two new reflexive studies described in the following sections.

4.1 Second reflexive study (2018–2019): Normativity in TA

From the beginning of TA, it was not always clear what a desired effect and what an unwanted consequence of a new technology is. Who should decide this, according to which normative framework? The emphasis on 'objective science' did not prevent TA from being accused of promoting certain sets of values over others. This may have had its roots in a seeming discrepancy: TA both pursued neutrality in a non-interventionist way and followed normative goals oriented at the common good, sustainability or Responsible Research and Innovation (RRI).

What is the normative framework of TA?

In addition, many practical questions with normative aspects emerge when carrying out a TA project. Which technologies should be assessed, who is to be listened to, whose values prioritised, which arguments should be considered legitimate and relevant and what decisions are to be proposed? More subtly, what are the implicit norms inherent in seemingly value-free technologies, and how can TA integrate the (objective) assessment of consequences and their (normatively tainted) evaluation? Especially in participative procedures, openly normative lay peoples' questions often meet experts' seemingly neutral technical assessments – how can they be reconciled within a TA approach?

searching for …
… implicit norms

Productively dealing with diverging claims requires awareness of the inherent norms. What is the stable normative core of TA, if there is one? What role do normatively inspired concepts from outside (such as RRI) play in daily practice? How can TA derive guidance from abstract norms in constitutions and fundamental rights? How do they change in different political contexts?

… a stable normative core of TA

The project will first establish a compilation of normative anchors as found in the literature that (in theory) govern the performance of TA. First results will be communicated at the 2018 annual spring conference, TA18, which will be devoted to the issue of normativity in TA. The findings from the literature will be compared with an assessment of normative frameworks inherent in different practical projects, actively involving TA practitioners from the ITA and from other institutions across Europe. The results will be put to debate during an international conference with the aim to set up a list of alternative normative foundations for TA in its different guises.

literature review

TA18

assessing TA practice via interviews

international conference

Clarifying where the values come from that direct the everyday work of TA and how they should be dealt with in an equitable and productive way will help TA in two ways: internally, to get a better insight into value-based practical problems and potential hidden conflicts, and externally, for transparently reconciling opposing arguments and generating viable options for a successful policy advice.

aims of the project

4.2 Third reflexive study (2020–2021): Rethinking participation: Analysing knowledge production in participatory TA

growing ITA experience with participation

In the last two decades, the ITA has made extensive contributions to theoretical and methodological debates on public engagement. The ITA has recently been involved with the design of new participatory methods and in the organisation of participatory events. In various TA contexts, the involvement of lay persons and stakeholders has been established as a proven method for taking knowledge from different actors into account. A further method we have used is 'invited participation' which is initiated and organised by professionals.

and growing scholarly concern

By challenging the deliberation process and the quality of knowledge generated, our methodological pluralism seeks to respond to concerns such as the risk of political exploitation of participation activities and its disconnectedness from real-world policy problems.

guiding questions

By focusing on the relationship between the quality of knowledge and the quality of deliberation in participatory processes in this study, we aim to reveal whether and how added values of participation are realised in practice. Important guiding questions include: Which participants are involved and what are their roles in the process? What is the quality of knowledge produced? Has such knowledge been used in political processes? Does the knowledge reveal new perspectives for assessing or shaping technologies? Is the deliberation process characterised by authentic reasoning?

case studies referring to three fields of TA activity

In terms of method, the study will be an in-depth analysis of finalised ITA projects dealing with a broad range of TA issues such as nanotechnology, neuroenhancement, renewable energy, and climate change. The relevant case studies refer to different fields of activity of TA using non-expert knowledge: (1) in support of political decision-making (Participatory TA), (2) in responsibly shaping technology (Constructive TA), and (3) in forward looking activities where citizens' visions of a desirable world are taken into account (participatory foresight CIVISITI method).