ÖAW AUSTRIAN ACADEMY OF SCIENCES

ITA INSTITUTE OF TECHNOLOGY ASSESSMENT

# MEDIUM-TERM RESEARCH PROGRAMME 2016–2018

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 studies examine 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 debate on controversial aspects of science and technology and 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 below 2). 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 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 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 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 example, 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.
- We address requests from national public actors, such as federal ministries, the Austrian Parliament and government agencies. We raise key issues 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***

- The ITA team regularly discusses future issues for TA studies. In our internal workshops we exchange and discuss our different disciplinary perspectives and individual experiences with our research, public and policy activities.
- 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 chapter 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 is normative and mission-oriented. Research at the ITA will 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 are 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 and the “Internet of Things” 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 infrastructure grows in capacity and complexity, and becomes “smarter”. The ITA will continue to focus on building understanding of the implications and interactions of developments such as ambient intelligence, autonomous systems, semantic computing and “smart” technologies with societal concerns of privacy, the preservation of human autonomy and dignity, and inequality.

***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 and technology ethics and human rights.

The ITA's planned and current projects[1] in the period 2016–2018 cover the following four areas:

- ***information society***

  In the broad research field of the so-called "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, human autonomy and values such as dignity or privacy. Although privacy issues have risen to the fore in the proliferation of ICTs, this topic remains pressing as the private sphere is being renegotiated with every new ICT development. Second, we research how these developments can be governed with respect to fundamental rights and freedom (such as for example informational self-determination, freedom of information and expression), including issues such as transparency and accountability of public and private institutions as well as the role of digital identities. Third, we focus on networked environments, the interlinking of hard- and software, information and people, knowledge generation and computational processes as an essential characteristic of the information society, whose potentials and impacts need special attention of TA approaches. This also includes academia itself as a user and co-developer of ICT (for example, in open science and citizen science). Fourth, we address political aspects of information technologies. Technological trends such as big data and artificial intelligence hold both promises and perils to society that open up new fields of research.
  Our projects until 2018 include topics such as performativity in software design, autonomous vehicles, cyber-physical systems, e-participation, smart environments, online gaming, assistive technologies, and others.

- ***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, and the role of ambient assistive technologies in demographic changes. 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 understand and assess sustainability and sustainable innovation. Particularly, we aim for a better understanding of local and regional as well as systemic effects of on-going developments in the enhancement of the societal value of technological innovation.
  Projects until 2018 include topics such as integrated smart city approaches, smart grid pilot projects, sustainable mobility solutions, and evaluation of sustainable innovations.

- ***governance of emerging technologies***

  The rapid growth of knowledge and integration between science and technology such as in the nano-, bio-, info-, and cogno-technosciences bring about innovations as well as new uncertainties and controversies. Past experiences with new technologies such as biotechnology suggest that future controversies may arise for concrete applications as well as research governance. Controversies surrounding technology and its applications are the starting point of our research. We investigate the reasons underlying their dynamics and provide the basis for policy. In sum, 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.

[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.

Projects until 2018 address topics such as neuro-enhancement, synthetic biology, nanotechnologies, techno-epistemic cultures, and bio-economy.

***participatory approaches***

- The ITA has a long tradition in testing, applying and developing participatory approaches to inform policy-makers on citizens' views on specific topics. We conduct panels, focus groups, and participatory activities involving citizens, stakeholders, and experts. Informed by the methods of constructive TA, participatory practices include technology developers (such as firms) and regulators. Furthermore, we analyse conditions and implications of participation in technology governance.
  Projects until 2018 include a citizen and multi-actor consultation on Horizon 2020, the evaluation of an EU project, and a project using constructive TA in researching and collaborating with software development teams.

# 4 Internal, reflexive studies at the ITA

***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 several topics for in-depth investigation. These topics address meta-level theoretical questions based on internal research experience. 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.

In the period 2016–2018, we will carry out the following two internal projects:

## *4.1 Policy advice in TA: communicational settings, actor constellations, objectives & standards (2016–2017)*

***diversification of the ITA's advisory practices***

In the past three decades, the conditions for scientific policy advice and for the TA field have changed significantly. Concepts such as "Post-normal science", "Responsible Research and Innovation" or "Open Innovation" suggest fundamental shifts in the relationships between science, policy and society. These shifts are also reflected in the ITA's advisory practices. The ITA has extended its advisory reach towards visioning and "upstream engagement", increasing importance of participatory approaches and the extension of potential addressees.

***reconstructing and reflecting on the prevalent modes of policy advice***

The objective of this project is to address the practice of policy advice at the ITA and to derive recommendations for its fit with changing policy environments. By collecting interview data with key policy practitioners at the ITA and the wider policy community, the project aims to reconstruct and reflecting upon the prevalent modes of policy advice at the ITA and barriers and supports to its effectiveness. Key questions include: Do different modes stabilize along specific actor constellations, technological themes, issues or individual practitioners? What role do traditional and post-normal paradigms play in advisory

practices? What do these results mean for the collective development of quality criteria and standards?

The theoretical framework for the project is based on scientific literature on , policy analysis, science and technology studies, communication science and TA. Our empirical basis will be the experiences and perspectives of the ITA researchers collected though face-to-face interviews. Methodologically we begin with a literature review and theoretical framework, and subsequent mapping and classification of the ITA's advisory activities. The interviews will explore motivations, perspectives and experiences of TA practitioners and serves to reconstruct the different paradigms that are implicit in the ITA's advisory practices. The interim results will be presented and discussed in a workshop.

***mapping***

***interviewing***

In the second stage of the project, we will conduct in-depth cases studies of four advisory projects that were carried out in the past years. In this process, we will investigate actor constellations, communicative settings, and criteria for success or failure of policy advice in different contexts. In a final workshop the ITA researchers will discuss the implications of the study results in terms of collective quality criteria and standards for advisory activities. The study will strengthen the ITA's capacity to address the intersections of science and policy and to contribute to the scholarly debate on scientific policy advice under conditions of "post-normal science".

***case studies***

***developing quality criteria***

## 4.2 Rethinking participation: analysing knowledge production in participatory TA (2017–2018)

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. 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.

***growing ITA experience with participation***

***and growing scholarly concern***

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?

***guiding questions***

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 (CIVISITI method).

***case studies referring to three fields of TA activity***