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Type of research

Technology impacts do not stop at the boundaries of scientific disciplines. In fact, they can only be comprehensively explored in the systems perspective from a number of different points of view. Therefore, our research is **highly interdisciplinary** and includes a wide variety of subjects, ranging from philosophy to social sciences, economics, and law to psychology and the natural and engineering sciences. And since technology assessment requires as many perspectives as possible, we often invite society, initiatives, and stakeholders, but also individual citizens to participate in our research.

Our topics do not arise from the inherent scientific logic, but from a **dialogue with society on equal terms**. Our work is problem-oriented, we listen to the perceptions, wishes, and concerns of numerous societal actors, for example regarding ecologic problems, new forms of mobility or the impacts of digitalization on our lives. The orientation towards the goal of sustainable development is decisive for all activities of the institute.

Our research is committed to **scientific independence and a claim to excellence**. The results contribute to societal debates and serve the progress of scientific knowledge – not only in technology assessment itself, but also in the disciplines involved, such as systems analysis, risk assessment, practical ethics, or sustainability and innovation studies.



Policy advice

Since 1990, our Office of Technology Assessment at the German Bundestag (TAB) has been providing advice to the members of parliament on all matters related to scientific or technological progress. Our focus is on fields of political activity such as the energy and mobility system, agriculture, the labor market, the health system, or research policy.

We also advise the European Commission and several federal and state ministries. Since 2005, we have been coordinating the European Technology Assessment Group (ETAG). This network of European TA institutions provides advice to the Panel for Scientific Technological Options Assessment (STOA) of the European Parliament.



Networking

Since technology impacts do not stop at the boundaries of disciplines or states, we have been working internationally for decades. This includes projects and networks with partners, for example, from Brazil, the US, India, Australia, Japan, or China.

At the national level, ITAS is part of the Helmholtz Association's research fields Energy and Information. In this context, we work together with scientists from other Helmholtz institutions on issues related to the transformation of the energy system and the digital transformation of society.

Institute for Technology Assessment and Systems Analysis (ITAS)



KNOWLEDGE for ACTION

Profile

ITAS is the leading institute for technology assessment in Germany and worldwide. ITAS was founded in 1995, but has a history of almost 60 years of technology assessment and systems analysis in Karlsruhe.

Technology assessment is important because **scientific and technological progress** does not only improve our lives, but frequently has unexpected and often undesirable effects: Climate change, environmental problems, data misuse, or collapsing traffic systems are among the most well-known examples. Knowing the spectrum of possible technology impacts at an early stage helps us to make good use of the **potentials** of progress and minimize or avoid the **risks**.

Along these lines, we provide the **knowledge required for actions** and point out approaches to solve the current global challenges. The results of our research are addressed to politics, the industry, and society, so to those actors who shape the scientific and technological progress.



Data, information, knowledge



The digitalization of large spheres of human life is progressing at a rapid pace. It entails not only technical and economic but also social change. Behind new IT infrastructures that make our so-

ciety work, are algorithms and huge amounts of data, which bear great potential, but also social challenges, such as adequate regulation.

The scope and dynamics of digital transformation is reflected in many ITAS projects. Of particular importance is the question of how to deal responsibly with the developments of digitalization and, specifically, applications of artificial intelligence.

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Sustainability and transformation of the energy system

The ecological crisis has been moving further up the list of pressing problems facing humanity for decades – not only because of climate change. Despite all the commendable progress in the efficiency of modern technology and all the efforts made so far, the crisis is far from being overcome. Creative approaches and new thinking are needed.



The importance of sustainability in our daily lives and its practical implementation in the international community is one of the central research fields at ITAS. Sustainability is also at the heart of real-world lab research, orients our research on the reorganization of economic processes toward renewable raw materials (bioeconomy), and guides ITAS's research on new technologies and transformation paths for the energy system. A concept for integrative sustainability assessment was also developed at ITAS.

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Mobility



The need for mobility of people worldwide continues to increase. This is due to economic factors, but also to migration, tourism, and the increasing global networking of many people. Thus, the associated

problems such as climate-damaging emissions, overloaded transport infrastructures, accidents, and noise are becoming more acute.

ITAS primarily investigates new mobility concepts, which deal with technical innovations on the one hand and with changing mobility patterns of people on the other. For example, we analyze the possibilities of autonomous vehicles as well as the ethical challenges of their use in urban environments, but also in the surrounding areas.

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Participation and governance

We do not know what the world will look like in 20 or even 100 years. But we can observe technological developments, social conditions, and political trends and depict possible futures. This shows that future technological consequences are created in the here and now. In the interest of desired developments, we must intervene and shape already today.



At ITAS, we address this challenge with a combination of new approaches to the long-term governance of long-term processes and their participatory design. We see long-term processes such as the phasing out of nuclear energy, the final disposal of high-level radioactive waste, the introduction of the bioeconomy, or the energy transition as socio-technical challenges. Fundamental considerations on how to deal with risk and non-knowledge also have their place at ITAS.

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Life and technology



Advances in biotechnology, information technology, medicine, and neurotechnology, including artificial intelligence (AI), can enhance the possibilities for a better life. This applies to individual areas such as

health, nutrition, and sport, but also more generally to work and everyday life.

ITAS has long been working on the convergence of biology and information technology. Research focuses, among other things, on new biotechnologies for understanding and (re) designing biological systems, various fields of robotics and AI applications, and the mechanization of humans through neurotechnology and prosthetics. Other areas of focus are assistive systems, and needs assessments in care, and more generally conditions for health and good living. The goal is always to align the governance of research and technology development with societal needs.

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Visions and ethics

Visions shape communication about science and technology in the media, but also play a quite significant role in the discourses of science and politics. These narratives about possible desired or feared futures and their ethical dimensions have an impact on our thinking, on political decisions, and on the course of science, which we must become aware of.



At ITAS, we explore the role of technology visions, analyze their preconditions and background, and subject them to ethical reflection. Examples are 3D printing, the importance of simulations and models, the possibility of a global agreement on technical and socio-technical visions and the ethical questions they raise.

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