

INTRODUCTION

Far-reaching scientific and technological visions are on the upswing. They promise to solve major problems such as the climate change or energy supply and to fulfil the ancient dreams of mankind such as decelerating or even eliminating the ageing process or creating artificial life. What initially sounds like earthly impressions of paradise may induce unease, concern and fear at the same time. The historical experience with regard to technology suggests to assume that ambivalences and risks cannot be avoided and that these might be bigger, the more extensive the technological interventions in nature and society will be and the more rapidly they will be made. The gap between hopes and expectations regarding progress on the one hand and concern and fears on the other hand is getting larger and larger and the waves of corresponding hope, hype and fear technologies come in rapid succession. This situation is a challenge both for social debates and for political decisions, e.g. research promotion and funding, and thus represents a topic of technology assessment – an example of topics this »TAB-Brief« is focusing on.

Scientific and technological visions are an important point of reference of the technology debate within society. In history, various forms of these visions played a significant role, e.g. for astronautics and nuclear energy – fields on which virtually utopian expectations were placed in the 1950s and 1960s. After years of disillusionment, scientific and technological visions are discussed again to an increased extent since the beginning of the century – even in the feature pages of the daily newspapers. Particularly in the field of nanotechnology (Drexler 1986), the Converging Technologies (Roco/Bainbridge 2002) and their interfaces to information technology and biotechnology as well as currently to synthetic biology, a lively communication has started about visions that are rather speculative and are reaching far into the future. Normally, *hope* and *hype* communication is soon followed by a wave of *concern* and then of *fear*.

Very often, it is a matter of one statement against another one or of positive expectation against feared risks. It is often very difficult to evaluate whether the things expected or feared in those visions have to be considered as a serious possibility or whether they are mere speculation. Now, one might say that all this is a colourful, more or less

intellectual game, which – due to its highly speculative character – is only a sort of communicative background noise without real consequences. This, however, is not the case. Visions have a partly significant influence on the perception of scientific and technological lines of development, on the public assessment and opinion regarding these topics and on the form and content of social debates with regard to scientific and technological progress in general. Speculative expectations as well as fears can structure risk debates, influence research promotion and decide on the acceptance of entire areas of technology. The risk debate about nanotechnology, for example, did not start with the obvious subject of a possible toxicity of nanoparticles for human health and the environment, but with futuristic considerations whether nanotechnology could make humans redundant due to self-replicating robots (Joy 2000) – a discussion with far-reaching consequences although it is rather irrelevant in substance.

The situation of visions – both *hopes* and *fears* – being able to have a considerable factual impact though they might be merely speculative, is the core challenge for public debates, politics and thus for technology assessment. Despite all the differences of the respective areas of

science and technology, this involves similar structural problems:

- > *Definition problem:* Often, it is hard to evaluate what characterizes e.g. nanotechnology or synthetic biology and what is new about it. This results in debates with regard to characterization and definition combined with the skeptical question whether the respective hype technology might be just an attractive label to attract attention.
- > *Technological determinism:* In the debates about hope and hype technologies, these mostly are assumed to have a deterministic intrinsic logic: It is said that the respective problems could be solved on a merely technical basis (e.g. the climate change problem could be solved by means of climate engineering) and the technologies *themselves* would result either in a catastrophe (Joy 2000) or in positive developments (more democracy due to the Internet).
- > *Content of values:* Hopes and fears, packed in visions, are a complex mixture of knowledge, estimates, ignorance, values and often also interests. Thus, they are normatively loaded and express the different perspectives and conflicts of a pluralistic society. These contents of visions often are not transparent which makes it difficult to discuss the different arguments.
- > *Hidden interests:* Stories about *hope* and *hype* as well as other types of futures (e.g. energy scenarios) can be used (and are used indeed) to transport interests, for example to create acceptance and to develop funding and promotion opportunities.
- > *Ambivalence:* The visionary pathos in many technological visions is susceptible to the question whether things might turn out differently – and in an open society,

it is almost sure that this question will be asked. Positive visions might become horror scenarios and utopias might become dystopias. The history of nanotechnology, but also the history of the Internet, is rich in ambivalence (Grunwald 2006).

- › *Inflation problem*: Hope and hype technologies focus on the new thing about them, because only like this it is possible to raise scientific, public and political awareness. As public awareness is a scarce good, there will be an inflation of scientific promises followed by the risk of an increasing lack of credibility.

This focus can only deal with some aspects of the comprehensive field. One of the great *hype* stories of the present time – with almost two decades of ups and downs already – refers to the relation of *Internet and democracy*. Ulrich Riehm deals with the historical roots of this relation and elaborates hopes, fears and disappointments which have characterized the co-evolution of Internet and democracy and which are still present in today's debates. *Nanotechnology* as the field which boosted scientific and technological visions to a considerable extent (Drexler 1986) will be introduced by Christoph Revermann. On the one hand, it fascinates due to the idea of a *homo faber* working on the molecular level who puts together atoms and molecules in a very targeted way – and on the other hand, it arouses

fears in view of the possibility of self-organizing systems getting out of control. The field of *synthetic biology*, presented by Arnold Sauter, consequently gets on with the visions of nanotechnology in the different areas of life. Here, as it is the case for many *hype* and *hope* technologies, the definition problem is an inherent characteristic: Is synthetic biology really a new area of research or is it just a label to attract public attention and to mobilize research promotion? *Geoengineering*, a relatively new approach for a large-scale solution of the climate problem by artificially »cooling« the Earth – a topic introduced by Claudio Caviezel – induces fascination and horror at the same time due to the global dimension of targeted interventions in the climate system.

In order to facilitate orientation in these areas of controversial hopes, expectations, concerns and fears, transparent and comprehensible criteria as well as appropriate procedures for a consideration of arguments and decision are required. Technology assessment – also and particularly in parliaments – has the specific mission of providing a rational and transparent review of the contents of scientific and technological visions as a basis for an informed and reflected consultation of politics and society (Grunwald 2009).

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