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## BMBF Foresight

### Foresight Follow-up of 'Futur – the German Research Dialogue' & 'The German BMBF Foresight Process'

Brief No. 240

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**Sponsors:** Federal Ministry of Research and Education BMBF – Germany  
**Type:** Series of embedded anticipatory & strategic activities on a national level  
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#### Purpose

The aim of the BMBF Foresight process that ran from 2007-2009 was to identify long-term priorities for German research and innovation policy with an emphasis on crosscutting systemic perspectives. The foresight process was meant to complement the German High-Tech Strategy, which had defined mission-oriented priority fields with a medium-term horizon. After the finalisation of the foresight process in 2009, an implementation phase with several interacting activities was launched in order to feed the results into other strategic processes. As a next step, BMBF set up an embedded, continuously learning foresight system with dedicated phases that will be repeated by all subsequent processes. Within this framework, the second foresight cycle was launched in early 2012.

#### Complementing the High-Tech Strategy

Before the first cycle of BMBF Foresight started in 2007, the German High-Tech Strategy (BMBF 2012a) had established a number of priority fields for research and innovation policy with a time horizon of 5-10 years. The foresight process was launched by the BMBF strategy department with the following main objectives:

- complement the High-Tech Strategy with a longer-term perspective on emerging technologies and potential priorities,
- identify emerging issues across established research and innovation fields,
- explore in which areas strategic partnerships might be required.

At this point in time, BMBF had not carried out any overarching foresight process since the FUTUR process (Giesecke 2005), which had been finalised in 2005.

As some actors within BMBF had a rather critical view of FUTUR, an important additional objective of the new foresight process was to (re-)establish trust and confidence in foresight within the ministry. Accordingly, high emphasis was placed on communication within the ministry and early-on involvement of all BMBF departments that were potentially affected by the foresight outcomes.

The foresight process was accompanied by a process and impact evaluation carried out by the *Institut für Technologie und Arbeit* (ITA).

#### Adopting a Technology Push Approach

As described in detail by Kerstin Cuhls in the preceding brief No.174 and in recent publications (Cuhls et al. 2009a), the methodology of the foresight process com-



bined several elements. The most prominent approaches were

- environmental scanning including a literature survey and bibliometric analysis and
- expert interaction through interviews, workshops and a national online survey.

In parallel, a monitoring panel composed of international top experts was interviewed twice in the course of the process.

As requested by the ministry, the foresight process adopted a 'technology push' approach. In the first phase in particular, the process concentrated on identifying emerging technologies with long-term relevance to the German economy and society within the established realms of research and innovation. The criteria to assess 'relevance' were established in interaction with the ministry.

In the second phase, the emphasis of the foresight process was placed on a second set of objectives: the identification of key issues emerging *across* these established technology fields. For this purpose, the results emerging from the technology push analysis were systematically reviewed and mirrored against major societal challenges such as sustainability and health. In this way, the seven 'new future fields' were developed as described in the previous brief. These fields are characterised by a highly dynamic development at the interface of emerging solutions and societal demand.

## Sharpening the Research Dimensions

### Participants

In line with the science and technology push orientation of the foresight process, the participants were mainly

research and technology experts, however, from diverse organisational and professional backgrounds. Along with the numerous national experts, ca. 20 highly renowned international experts from the key science and technology fields under investigation were involved through the international monitoring panel. In one of the conferences that focused on innovation policy instruments, practitioners and researchers in the realm of innovation policy were gathered. In the final phase, when developing the 'new future fields', more and more social scientists were involved. So, for instance, in the case of 'human-technology interaction', a workshop with philosophers and sociologists, on the one hand, and engineers and programmers, on the other, was carried out to sharpen the research dimensions (Beckert et al. 2011). Finally, there was intense interaction with actors from various BMBF departments particularly in the later phases of the process in order to validate and enrich the foresight findings.

### Intended Users

The first cycle of the BMBF Foresight process addressed two main user groups. First of all, the process sought to maximise its usefulness to the various departments *within BMBF* that are responsible for steering the BMBF support to research and innovation in their respective domains. The main benefits envisaged for the departments were the possibility to mirror their own perceptions against the foresight findings, gain an overview of each other's activities, develop overarching perspectives, and identify potential linkages and possible blind spots.

Secondly, the foresight was meant to serve the *wider innovation system* by providing long-term anticipatory intelligence for orienting strategy building within and among diverse organisations.

## Crosscutting New Future Fields

The tangible output of the foresight process consisted of two core reports (Cuhls et al. 2009b and c). One report listed the selected themes with high long-term relevance in fourteen established research and innovation fields. The other report spelled out the seven crosscutting 'new future fields' and provided an analysis of key actors in the German innovation system as well as recommendations for policy action within these fields.

### Dissemination

The reports were first disseminated within the BMBF and later widely throughout the innovation system starting with a large public conference. Within the ministry, the uptake of the findings was actively supported through dedicated workshops where the project team members presented the findings and discussed the implications with the departments.

## Implementing Strategic Dialogues

In order to further facilitate the uptake, two follow-up projects were launched: The first was the 'strategic dialogues' where innovation system actors who had been identified in the foresight report jointly discussed options for implementing the findings. In one case (Production-Consumption 2.0), several other ministries, such as the ones dealing with the environment or food and agriculture, were involved in this debate. In a one-day workshop with more than 30 participants, diverse stakeholders debated the transdisciplinary research around the transition towards sustainable production and consumption that had been proposed by the foresight process.

Secondly, the 'monitoring system' was set up in order to keep track of the evolution of the new future fields and inform the ministry in case further action was needed.

## Direct Impact

**Within the ministry**, the uptake of the foresight results differed according to the type of outcome. In case of the future *topics in the established fields*, there was initial reluctance within the ministry's departments as these findings seemed to trespass on their own domains of activity. In several cases, however, the departments perceived the availability of findings from an independent process as a mirror for their own strategic thinking as useful. Several of the topics proposed by the foresight process were taken up by subsequent BMBF funding initiatives.

In the case of the 'new future fields', there was a general appreciation of the 'bird's eye view' across established domains of ministerial activity that the process provided. Several attempts were made to take up the proposed perspectives. As the new fields did not match the existing organisational structures of BMBF, the implementation was not straightforward. This, however, was seen as an asset rather than a problem by the strategic department as the crosscutting perspectives were viewed as long-term guidance for strategic thinking within the ministry rather than an agenda for immediate implementation.

In case of the future field 'human-machine cooperation', a new department was created in order to pursue the transdisciplinary perspective proposed by the foresight process. For 'ProductionConsumption 2.0', a few smaller seed projects were launched to explore some of the core issues. In both cases, several aspects inspired the BMBF programmes in domains such as production, environment, security and ICT. Finally, several of the core findings of the foresight process were fed into the strategic debate around the renewal of the High-Tech Strategy, which was taking place in parallel.

In addition, several of the foresight's suggestions entered the strategic debates in the **wider German innovation system**. The project team received numerous requests from the governments of the Länder (German states), research institutes and companies to discuss the implications of the 'new future fields' on their own strategies.

At the **European level**, the 'new future fields' were recognised with interest as well. At the time, the European Union was seeking to orient its research and innovation activities towards the grand challenges of our time in a

systemic manner. In a special event that was organised by the Social Sciences and Humanities (SSH) foresight group, findings from several foresight processes that sought to connect key technologies and grand challenges in a systemic manner were reviewed, among them the German case (EC 2011). In the context of an EU expert group on the future of Europe 2030/2050, suggestions for such systemic priorities from several countries were compared (Warnke 2012). The review revealed that the German 'new future fields' were among the most far-reaching suggestions for integrating technological and societal dynamics into systemic 'transformative priorities'. At the same time, it was noted that exercises in other countries, such as the 'Netherlands Horizon Scan', had defined some areas that were well in line with some of the 'new future fields', such as sustainable living spaces and human-technology cooperation. Nevertheless, the analysis suggested that there are no 'one-size-fits-all' systemic priorities as each cultural context requires its own specific framing of the issues at stake.

Furthermore, the foresight process attracted considerable **international** attention, partly due to the fact that there had been substantial involvement of international experts through the monitoring panel and two conferences with international participation. After the process was finished, several countries around the world expressed their interest in both content and methodology.

Finally, within the **academic community** concerned with the governance of research and innovation and forward-looking activities, the German foresight experience was widely published and presented. In particular, the challenge of generating truly systemic socio-technical perspectives and feeding such perspectives into governance structures, which are organised according to their own rationale, created wide interest and debate (cf. e.g. Warnke 2010).

## Indirect Impact

As outlined above, paving the ground for embedding foresight into BMBF strategy building was an important objective of the process. The evaluation report confirmed the substantial progress made in this respect. Several actors in the ministry felt that they had benefited from the foresight process and expressed their renewed openness and positive attitude towards foresight approaches.

## Follow-up: Embedding Foresight

As a consequence of the perceived success of the first foresight process and in following up on the recommendations of the evaluation team, the ministry decided to establish foresight within the ministry as a continuous anticipatory learning process.

For this purpose, a 'foresight system' was designed and implemented (BMBF 2012 c). This system cyclically evolves through the following phases: scanning, analysis, implementation and preparation of the next cycle. The previous foresight process was considered a pilot for the first cycle. Furthermore, it was decided that the second cycle should focus on the demand side of research and innovation and therefore primarily explore relevant societal changes that could then be

linked to the technological trajectories suggested by the first cycle.

Based on this framework, a call for proposals for the second foresight cycle was launched. A consortium of the VDI Technologiezentrum and Fraunhofer ISI was selected to carry out the project, which started in May 2012 with a new 'search phase'. Again, the project is being accompanied by an evaluation process conducted by ITA to keep track of lessons learned and to optimise the communication processes. This time, a board comprised of actors from key organisations of the German innovation system has been set up to accompany the foresight process. From the beginning, the approach and findings are discussed with the BMBF departments on a regular basis.

A separate EFP brief will be issued in order to describe this new process in detail.

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