- Healthy nutrition
- Learning from cultural coexistence
- Beyond the family? The development of social cohesion in demographic change
- Changing economic systems
- The energy turning point in transport
- Ethics in research
- The future of education – education for the future.

Notes

1) FUTUR was organised and conceived by a consortium led by the Institut für Organisationskommunikation (IFOK GmbH). The complete consortium is listed in the contribution by Kerstin Cuhls in this issue.
2) The 1462 participants in FUTUR consisted of 17.8% social scientists, 16.4% engineers, 22.0% natural scientists, 16.6% economics and law, 6.5% physicians and others.
3) Detailed descriptions on the goals and contents of the lead visions are available from http://www.futur.de

Literature

Banthien, H.; Ewen, C.; Jaspers, M.; Mayer-Ries, J., 2002: Welche Zukunft für Foresight und Forschungspolitik? Futur als methodische, inhaltliche und institutionelle Innovation. In: Development and Perspectives. Heft 1, S. 25-46

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On Key Issues of Foresight: Participation, Prioritisation, Implementation, Impact

Report on the "Futur-Workshop" in Berlin, December 13 - 14, 2002

by Knud Böhle, ITAS

On December 13 and 14 of last year, an international workshop took place in Berlin on "*Participatory Priority-Setting for Research and Innovation Policy – Concepts, Tools and Implementation in Foresight Processes*". The event was part of „Futur – The German Research Dialogue". Its outstanding characteristics are the involvement of a broad range of societal groups in the dialogue, its wealth of methods (e.g. panels, future workshops, open space discussions, online-voting), and the expected implementation of „lead visions" generated by this process at the level of research funding policies of the German Ministry of Education and Research (BMBF). In December 2002 *Futur* had already worked out four „guiding visions". One of them "Understanding Thought Processes" was about to be adopted as a guideline for research and innovation policy by the BMBF. The evaluation of *Futur* by a panel of international foresight experts was in its final phase, and Luke Georghiou (PREST, University of Manchester) chairman of this group presented preliminary results, some of which will be later referred to. The final results of the evaluation were delivered 28th of May 2003. As project *Futur* is well documented, and also subject of an article by Volkmar Dietz in this issue (see page 29 ff.), it needs no further introduction here.[1]

The workshop was organized by two of the *Futur* consortium members, namely IFOK (Institute for Organisational Communication) and FhG-ISI (Fraunhofer Institute for Systems and Innovation Research). Speakers invited beyond the *Futur* context were renowned experts closely related to recent foresight or TA exercises in their countries. In order of appearance: Terutaka Kuwahara, National Institute of Science and Technology Policy (NISTEP), Japan; Peter Waller, Young Foresight, UK; Ahti Salo, Helsinki University of Technology, Finland; Thomas Durand, CM International, France; Jan de Wilt, Innovation Network Rural Areas and Ag

ricultural Systems, The Netherlands; Helena Acheson, Forfás, Ireland; Lars Klüver, The Danish Board of Technology; and Lennart Lübeck, Swedish Technology Foresight. European level foresight was presented by Werner Wobbe, Research Directorate-General (Directorate K: Knowledge-based society and economy; Unit 2: Science and technology foresight…) and Ken Ducatel, Joint Research Center, Institute for Prospective Technological Studies, Seville (JRC-IPTS), and industrial foresight by Ingo Rollwagen of Daimler-Chrysler's Society and Technology Research Group (Forschungsgruppe Gesellschaft und Technik).

The speakers covered a wide range of perspectives, approaches and experiences. In addition, about 40 invited experts contributed to the open and frank debate. The organization of the workshop was excellent and its aim of stimulating debate about key issues was met, namely: participation in foresight processes, priority-setting, and implementation. The workshop was also an opportunity to learn about recent foresight exercises.

1 Participation in Foresight Processes

Participation of experts and stakeholders in foresight processes is common practice. A more recent approach is to increase the number of participants and to involve a broader spectrum of people with different backgrounds, who are often laypersons with respect to technology. *Futur* is a case in point with a total of more than 1500 participants coming not only from science, technology and business, but also from NGOs, education, media and arts. Luke Georghiou even said that *Futur* had broken "new ground in securing broad participation". One argument in favor of broad participation, and the one underlying the design of *Futur*, is based on the assumption that societal needs are better introduced into the foresight process this way. After presentations on *Futur*, the issue of participation was dealt with in a contribution from Japan and another from the UK.

Japan has a long history of national technology foresight exercises making use of Delphi surveys. The inclusion of social needs however did not start until the fifth survey in 1992 as Kuwahara explained. In the sixth survey (1997) societal needs were still defined by technology experts. It was however felt that the view of technology users was not adequately reflected this way. Therefore the approach of the seventh survey was changed. Although the organizers had first thought of involving the general public, this idea was abandoned due to time and budget constraints. In the end three "need field subcommittees" (on socio-economic systems, ageing, safety and security) were established with experts from cultural and social sciences participating. The topics generated by these subcommittees were then taken into account by the technology field subcommittees challenging them to consider what technology can do to fullfil the needs. Today NISTEP is already planning the eighth foresight survey (2003-2004). The "needs approach" will be continued and a huge network of about 3.000 experts will be involved. Participation of non-experts however still seems to be absent.

The next speaker, Peter Waller, CEO of "Young Foresight", presented quite a different approach to participation. Young Foresight is foremost a curriculum initiative (for the subject Design and Technology) and a teacher training project. The aim is to improve the quality of science and technology teaching in the UK, to stimulate interest in science and technology, and to strengthen entrepreneurial culture amongst young people. Young Foresight started in 1999 as "a natural extension of the Foresight Programme". Implementation in all secondary schools in the UK is scheduled by 2006. It will cost a total of about £ 6 million. This initiative is interesting first because of its aspiration to contribute to a generalized "foresight culture", and second because of its claim "to inform the Foresight Programme with the thoughts and aspirations of the next generation". The feedback loop from "Young Foresight" to the UK Foresight Programme does however not yet seem to be effective.

2 Discussion I

In the debate it was pointed out that broad participation is not a value *per se*. So what is it good for? To sum up what I have learnt: Obviously the reflection on the future of technology should not be left to technology experts alone, and it makes sense to bring in societal needs

(wishes and social values), additional creativity and new ideas by inclusion of new entrants in the foresight process. As long as this process is regarded as a mere source of inspiration for decision-makers, as a means to raise awareness or to facilitate broad dissemination of results, participation is not a controversial issue.

Things get more difficult when the results of a participatory foresight process are assumed to produce "legitimacy" and to have a deliberate impact on the decision-making process. What seemed to be a simple game turns out to be a strategic one, and the outcome a bone of contention. Immediately a set of critical issues comes up: the knowledge and competency of the participants with respect to the subject matter, the type and quality of knowledge provided to inform participants, the composition of participants and whom they represent, the risk of "lobbycracy", and the (in)ability of participatory processes to deal with conflicts. With reference to *Futur* for example questions were raised whether small and medium enterprises had been represented sufficiently, whether the selection of participants was really "lobbyproof", whether the (material) incentives for non-lobbyists were sufficient to maintain their interest, and whether their potential influence (or non-influence) was sufficiently clear to them. The expected benefits of participation might not only be undermined by vested interests, its potential impact might also be overestimated, because legitimate policy-makers will impose their own rationale, the closer it comes to decision-making.

Therefore the term "participation", which might evoke the idea of effective participation in a democratic decision-making process, has to be used with caution. Maybe "involvement", as was suggested, might be a suitable expression to replace it. Nevertheless results of a foresight process with broad „involvement" may have positive effects on political decision-making serving as a sort of backing and support for the implementation of e.g. new research priorities.

3 Filtering of Themes and Priority-Setting

In the next session five examples of priority-setting were presented. In each case the type of selection at stake was quite specific. In the first case Ahti Salo reported about the selection of themes by the "Committee for the Future", i.e. the Finnish Parliamentary TA body established in 1993. In Finland members of Parliament play a very active role selecting TA themes and supervising the progress of the studies commissioned. The selection of a subject to be investigated starts from a couple of short structured papers on possible themes prepared by TA experts. Members of parliament then simply discuss these options and choose one of them. The studies commissioned range between € 30.000 and 40.000. Foresight methodology is rarely used. In a project on energy 2010-2030 however, focussing on the health effects of selected energy technologies, a modified version of a Delphi was applied.

Next Thomas Durand of CM International reported about the selection of technologies and themes in "Technologies Clés 2005", the most recent French foresight exercise. The task was to identify technologies "important" for the future of industry and economy in France and Europe in 2005. The project was commissioned by the Ministry of Industry. 650 experts were involved, and € 1.2 million were spent in 18 months. The results were published in October 2000. The selection of technologies started from 518 technologies in 8 thematic fields identified by the experts. Using criteria of "attractiveness" (industrial and economic relevance, environment preservation, societal needs, national and European security, technology dynamics) the number was reduced to about 200. The application – in a next step – of "competitive position" criteria (scientific and technological position, industrial and market position) led to 119 key technologies.

In a convincing way Durand explained that the identification of a "key technology" has to take into account two perspectives: one that relates technology to research challenges and technological options, and another that relates technology to functional needs (e.g. miniaturization, noise reduction), applications (products) and application areas (sector of the industry). A key technology can then be defined by a matrix indicating on the one side what functional needs it fulfils, in which applications it will be implemented, and in which application area it will be deployed. On the other side, the technological challenges to be solved in order to achieve a technological breakthrough will be indicated, in addition to the scientific fields where research is

needed to achieve this goal. This approach includes an evolutionary perspective of technological development, as the matrix is able to a certain extent to reflect the state of a technological development.

The next speaker, Jan de Wilt, dealt with a sectoral foresight. In this case the priority was clear from the outset: the agricultural sector of the Netherlands was to be changed from a growth model, based until the eighties on big agro-business, to more sustainable forms of development. Thus the project was about "systemic innovation". It was funded (€ 4 million) between 1995 and 1999 by the Dutch government, and was supported by a foresight network of more than 1,000 people, including experts from agriculture, and many experts from other fields affecting the agricultural sector like science and technology. About ten different methods were applied. A sophisticated design of cycles of divergence and convergence, of analysis and social interaction reportedly made this project a big success, stimulating debates of "unusual intellectual freedom" and high creativity leading to an interchange of views, and alleviating thereby potential conflicts. Ultimately it was possible to achieve "shared visions" supporting the structural change of the agricultural sector. This foresight process also led to an institutional change: the coordinating body, the NRLO (the Dutch National Council for Agricultural Research), a small independent organization, was transformed into the "Innovation Network for Rural Areas and Agricultural Systems" with new tasks such as pilots, feasibility studies, education etc. New foresight activities are a minor part of the programme; some foresight exercises on specific topics are scheduled.

A case of embedded, company specific foresight (also termed: integrated technology assessment) was presented by Ingo Rollwagen of DaimlerChrysler. The function of this type of foresight is clearly defined as to inform decision-makers how to increase the company's competitiveness and value creation potential. As company relevant technological trends and trajectories are dealt with in specific R&D departments, the Society and Technology Research Group deals mainly with social factors and their impact on innovation dynamics within a time horizon between 2005 and 2015. According to Rollwagen, priority setting in a company has to reflect the following question: "Who sets which priorities with which intentions and expectations in which context (for whom)?" While this question might look at first like one of the many free floating management rules, it is indeed a valuable approach to think about qualities and realities of "priorities". For example, do those setting a priority really have the power and resources for successful implementation and realisation in an arena of actors with different priorities? Who and what depends on whether a priority is set or not? Does the setting of a priority imply a long-term commitment or is it rather a flexible arrangement to be re-negotiated from time to time (e.g. after general elections) *et cetera* …

The last speaker of this session, Ken Ducatel, IPTS Seville, reported about a project carried out at IPTS with support from the ESTO network in 2000, aiming at identifying emerging research priorities at the European level. The approach integrated two perspectives on technology, a "societal challenge perspective" and a "science and technology opportunities perspective". While the first looks at major European concerns that may benefit from research efforts at the European level and research coordination, the opportunities perspective looks at emerging fields, transdisciplinary S&T fields and at the exploitation of breakthroughs. On the one hand five societal "mega challenges" (= major European concerns) were identified, mentioned here merely as catchwords: "Knowledge Europe", "Sustainable Europe", "Healthy Europe", "Building Europe", "Energy & Mobility". On the other hand 10 scientific and technical areas were identified (in short: ICTs, Gene S&Ts, Nano S&T, Materials, Complexity, Fundamental Science, Knowledge S&Ts, Health S&Ts, Sustainability Technologies, Social Sciences), where European research and cooperation is expected to provide benefits. Achievements on this side are of course understood as essential to cope with the "mega challenges". Those topics requiring specifically European level efforts were selected using a set of 15 criteria "to test the European relevance of research themes". Parameters to justify European efforts are for example: scale, complexity, mutual learning, decrease of skill-gaps, strengthening a common European position (e.g. standards), fostering existing European strengths,

enlargement relevance, preservation of cultural heritage etc. The talk of Ducatel was very helpful to get a flavour of the special conditions and intentions guiding European level research.

4 Discussion II

In general, priority setting can mean many different things. In *Futur* a bottom-up approach (workshops, "open space conference", voting) and a top down selection process by the BMBF were combined to select "lead visions" which are to serve as guidelines for the implementation of research funding, especially in fields where societal needs and relevance for everyday life should have a say. In the case of parliamentary TA in Finland, selection means just choosing themes for TA-studies to be commissioned. In the French example it was about the identification of a hundred "critical technologies" without commitment for policy. In the Dutch sectoral foresight, a shift from agrobusiness to sustainable agriculture was at stake and the exercise was to help set the new agenda in a relatively non-conflictive way. The rationale of foresight embedded in a company is of course determined by the company's strategy in a competitive environment. Finally the task of the IPTS to define European research priorities within the multilevel governance structure is again quite a unique task. Nevertheless the provocative question came up, why in all of these cases the same list of priorities should show up with biotech, ICT, nano etc. While this seems to be the case, it was convincingly argued that important differences become immediately visible, as soon as one has to define which instance of a technology to favor and which actions to take in a given context.

The following discussion was mainly about participation as a procedural step for the selection of themes within *Futur*. There were caveats raised pointing to the risk that broad participation might lead to a redundancy of steps in the process, to "blurred decision-making" or would turn into "symbolic policies". Another point debated was transparency. Some argued that it has not been completely clear to the participants to what extent their contributions would have an impact on priority-setting and decision-making. Because of this uncertainty, some were disappointed that topics they had strived for, were later excluded, and some even suspected a "hidden agenda". Others doubted however, whether complete transparency (explaining the whole process in detail to everyone) would be wise. There were also suggestions how to make participation more efficient. Instead of anonymous and equal treatment of statements, statements clearly related to the person making it would increase quality, and statements a person had fought for would often be the most interesting ones.

The term "hidden agenda" was picked up by others debating whether in fact *Futur* had a "hidden agenda". If hidden agenda means that results of *Futur* are used to "re-assure decision makers" and to support the adaptation of an organization facing cross-departmental issues, then one might say so. But that's neither new nor a "hidden agenda" as foresight exercises always aim to have effects on knowledge and relations of actors.

5 Implementation and Impact

In the final session Volkmar Dietz of the German Ministry of Education and Research (BMBF) talked about the four "lead visions" developed by *Futur*, and the implementation of one by the ministry. He stressed that *Futur* had helped to foster strategic thinking within the ministry and he announced the continuation of *Futur* (see the contribution by Dietz in this issue, p. 29 ff.). *Futur* is obviously a case where a foresight project did have a real impact on policy.

Helena Acheson presented the Irish Foresight exercise as "definitely a success". The task of this exercise carried out between 1998 and 1999 had been to identify strategic S&T priorities for investment under the National Development Plan 2002 to 2006. Priorities proposed were in fact selected and adopted by the National Plan. It led in particular to the strengthening of Irish third level education and research capability in the area of biotechnology and ICT, and to the establishment of the Science Foundation Ireland with a budget for Technology Foresight of over € 700 million.

Werner Wobbe talked about the implementation of Foresight in the Sixth Framework Programme. He sketched the history of foresight at the European level and explained the

current approach touching upon envisaged measures like the integration of foresight in large EU projects (Network of Excellence, Integrated Project), a European "knowledge sharing platform" and an academy for foresight. More details and the current state of things can be found in the article by Wobbe in this issue (cf. Wobbe, p. 49 ff.), and a working document on foresight in the Sixth Framework Programme (latest version: May 27, 2003 http://www.cordis.lu/foresight/).

Next Lars Klüver, director of the Danish Board of Technology, the parliamentary TA body of Denmark, talked about "social embedding of future technologies". The main idea of this approach is to handle societal challenges during the life cycle of a technological development. This requires room for analysis and dialogue. Klüver stressed that it is important to concentrate on controversial themes and to get opponents to participate. The Danish approach to some extent resembles the Dutch one. As de Wilt had already pointed out, dialogue might contribute to alleviate conflicts. In Denmark "consensus conferences" aim at this. With respect to "implementation" a relaxed wait and see position is taken: You deliver something, and then the public, stakeholders, and decision-makers will use it somehow, i.e. in a non-deterministic way. The only concrete example Klüver gave of the "embedded approach" was a project on gene technology.

Finally Lennart Lübeck presented the Swedish Foresight exercise, which constitutes the rare case of a foresight exercise encouraged by industry with a mere 20 % of funds provided by government. It was carried out between 1998 and 2000 and was a clear success in terms of implementation. As Lübeck said "The government almost entirely accepted the recommendations and priorities of technology Foresight" and took them into account in its bill on R&D policy in 2002. The project also led to a high esteem of foresight in Sweden, e.g. VINNOVA, the Swedish Agency for Innovation Systems, has been instructed by government to integrate Foresight into its strategic development process. Maybe even more impressive is its spill-over effect with new foresight activities emerging: "The Ericsson Foresight" started in September 2000, the "West Sweden Foresight" in 2001, the "Wireless Foresight" sponsored by Telia and the Royal Institute of Technology started in September 2001, an "Energy Foresight" by IVA was carried out during 2002, and last not least, a new *national* Foresight exercise was scheduled to start in 2003.

6 Technology Hindsight as a Method of Technology Foresight

Towards the end of his presentation Lübeck turned to a study on "Technology Hindsight" produced at the beginning of the Swedish Foresight exercise. This study had analysed earlier foresight projects world-wide trying to draw some conclusions on typical pitfalls. It is worthwhile to repeat them here in a short form. "Foresighters" are inclined to think (1) that new technology will completely replace existing ones, that (2) new technology will be an extension of existing technological systems, and that (3) technology will be able to solve social problems. They often (4) miss the real dynamics because they don't assess developments of technology in different fields in an integrative way; they (5) often neglect economic aspects of technology developments, they (6) often ignore that rational choice is complemented and often superseded by irrational considerations; they (7) often ignore that their information base is insufficient as many technological developments take place secretly, e.g. in the military sector, and finally (8) they are often "prisoners of Zeitgeist" believing that the big issues of today will be the big issues of tomorrow. "Who can be sure that highly acclaimed ICTs and biotechnologies of today", Lübeck asked, "won't experience the same fate as the once highly acclaimed space and nuclear technology in the 50s and 60s"?

7 Discussion III

The round table about implementation at the end of the workshop turned into a general debate about foresight touching upon many open questions. It was interesting to see how differently the main purpose of foresight is defined. While some stress vision building, awareness raising, and production of recommendations, others stress the functions of producing irritation and changing "mind sets" from within ministries down to public debate. Other experts highlight the secondary effects, seeing foresight as a vehi

cle for institutional change and a way to establish an improved interface between society and science. Because foresight can do so many things, each exercise needs a clear focus.

Another issue was whether foresight should be more reflexive. This issue has several aspects. Some recommended Foresight should be more *science-based* in terms of applied systems analysis and decision theories etc. Others asked for more reflexivity with respect to the political game of which foresight is part. Someone said foresight "would be playing with fire" as it may change democratic procedures, others stressed that foresight could be a strategic policy tool, to rule out old boys networks for example. It was also demanded to better understand "participation" and the influence of the organisers on the outcome of a foresight process. The difference between TA and Foresight was another topic. It was said that Foresight would be weak in Finland and Denmark because TA was strong in these countries. At the same time there was a warning not to separate Foresight and TA as they have a lot in common.

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Note

1) Information on *Futur* is available on the project's website at http://www.futur.de/de/index.htm. See also the articles by V. Dietz and K. Cuhls in this issue. Further readings (in German):

- Banthien, H.; Ewen, C.; Jaspers, M.; Mayer-Ries, J., 2001: Welche Zukunft für Foresight und Forschungspolitik? Futur als methodische, inhaltliche und institutionelle Innovation, In: Development and Perspectives 1(2001)1, pp. 25-46.
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