Lessons for policy-making from Foresight in Non-European Countries

Policy Paper by the Research, Innovation, and Science Policy Experts (RISE)
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INTRODUCTION
This study on “Bringing Foresight to decision-making - lessons for policy-making from selected non-European countries” serves as a background paper for a Position Paper of RISE. To gain additional information, it was decided to monitor new developments in Foresight in several non-European countries with a focus on Southeast Asia. This study gives some examples of the application of and impacts on policy-making that offer lessons which can be learned in their specific cultural and political context and help to better design the interface between Foresight and policy-making. The study is therefore highly selective. It is based on officially available publications, databases from own projects of RISE members (overview on the developments in the world, including the European Foresight Platform EFP), direct information from RISE members, unofficial papers by external experts and “insider knowledge” gained via short interviews and telephone discussions. The recommendations from the background study are transferred to a Position Paper.

BACKGROUND: WHY ARE WE LOOKING AT NON-EUROPEAN COUNTRIES?
Several countries in Southeast Asia have many years of experience in performing Foresight, others have just started. As these countries have very different innovation systems and especially a different “ecosystem”, in which science, technology and innovation are performed, differs (see e.g. Innovation Union Scoreboard or Frietsch et al 2010), policy-making is influenced in different ways. A study performed for RISE by member Kerstin Cuhls therefore looks at selected countries in East Asia and Australia in order to understand their way of making use of Foresight processes and the results for policies of any kind. As described in different EFFLA Briefs, especially no. 14, both, the process of forward-looking and the results in different formats, can be applied actively and have an impact on policy-making.

This study gives some examples of the application of and impacts on policy-making that offer specific lessons which can be learned in their specific cultural and political context. In contrast to European Foresight activities, some applications are more “streamlined”, others are much diffused. The virtual APEC Foresight Centre even tries to coordinate activities of different countries and is therefore comparable to some of the activities in the European Union.

DIAGNOSIS: AIM OF THIS STUDY
This study has as its starting point the assumption that there is something to be learned (good cases and pitfalls) from non-European countries, in this case selected APEC countries, regarding the question how to make active use of Foresight in policy-making. The aim of the study is to contribute to the following questions:

- Are there good Foresight practices in non-European countries (in contrast/ compared to European countries) with respect to contributions to and for policy-making? We cannot compare the projects/programs directly but can contrast e.g. objectives, breadth, participation, implementation, policy outcomes etc.
- Do these practices depend on the specific innovation system (including system, culture, political background...) or are there learning effects for the European Commission?
- In what contexts are the Foresight processes applied? What are their aims? What are their strengths and where are any pitfalls?
- What are the decision-making processes and what are the reasons for them (if we know)? What are lessons for the European Commission? What can be transferred and what is case-specific?

STOCK-TAKING: FORESIGHT ACTIVITIES IN SELECTED COUNTRIES

Objectives and Policy Impacts by Foresight
Foresight is defined as the systematic and long-term view into the future with implications for today, and it is performed in many policy settings. Foresight involves the systematic consideration of different
futures in order to foster debates, scan the horizon, and anticipate changes, opportunities as well as disruptive emergencies. Based on the conviction that the future can be influenced strategically, Foresight aims to help prepare policies and policy measures (EFFLA Policy Briefs no. 1, 2, 9, 11; 2012-2014). More specifically, Foresight is used to support priority-setting, develop thematic portfolios, and identify critical technologies that guide national or organizational investments. Participative processes are often regarded as a component of Foresight and are used to foster stakeholder involvement and public engagement in both the development and implementation of policies.

The objectives of the Foresight processes are different and so are the policy implications. In some cases, side-effects have occurred, hidden agendas could be observed, or the objectives were adapted during the course of the process. Some Foresight processes even have a list of objectives to be served with different methodologies (e.g. the “four pillars” of the 8th and 9th Japanese Foresight). But in most cases, the “interface” between Foresight and policy-making is a gap rather than a bridge. Policy-makers are rarely directly involved in the exercises not to “advise themselves” and the organizers of Foresight activities are in most cases scientific actors. Therefore, in most cases, ways had to be found to bridge this gap.

The following policy applications, operative ways of making use of Foresight activities and their results as well as a more indirect use can be found in the selected examples. Concerning the objectives of Foresight, in all countries, new topics for the portfolio of the countries’ activities in science and technology (+innovation) are searched for and assessed. The way this search is performed is different (some perform large Delphi surveys or describe scenarios, others conduct workshops with experts or actors from the innovation system or have standing panels/commissions) and ranges from face-to-face discussions or presentations of the results to the direct use of a master plan (including deriving budgets from the processes).

For this short overview, we concentrate on the following countries and projects:

**Australia**

Between 1994 and 1996 a major Foresight activity “Matching Science and Technology to Future Needs: 2010” had already been performed, followed by different surveys and scanning activities. In 2014, Forward 2035 was published to broaden the perspectives on security issues. Australia Forward 2035 intends to describe the complexity of the whole field of security and to find (science and technology) answers to the fundamental changes Australia is facing (described in the Asian Century White Paper).

**China**

China has a long tradition of prognosis and forecasting quantitative data. For some years now, Foresight has also been performed with national Delphi surveys in different technology fields. A new National Technology Foresight has just been performed (2013-2015). Its objective is to perform an analysis of development trends of S&T, major S&T demand, a technology Foresight survey and the selection of national key technologies. These achievements of the project are supposed to provide effective support for the research group of the “thirteen-five” S&T plan and important references of the development trend of S&T for the public.

**Japan**

Japan has the longest experience, starting with Delphi Forecasts in 1971 and broadening the activities to a combination of scenarios, science maps, Delphi surveys, panels and workshops. The Japanese Foresight no. 9 was successfully completed in 2010; the 10th Foresight is just finished in 2015, but only partly published. In the 9th Science and Technology Foresight, the main theme is “Contribution of Science and Technology to Future Society”, the exploration of scientific and technological solutions for four grand challenges: central player in the scientific and technological arena, sustainable growth through green innovation, to develop a successful model for an affluent and vibrant aging society, and safe and secure life. A special focus is on “green innovation” and “life innovation”. The process was conducted to provide information which is useful for the discussion of the Fourth Science and Technology Basic Plan. It intended to clarify policy measures to be taken in view of coping with future challenges.

**South Korea**

South Korea adapted the 5th Japanese Delphi for its own purposes and has meanwhile developed its own way of setting priorities for policy-making. The 4th Korean Technology Foresight Program was finished in 2011. Its objective was to provide the vision and direction of emerging S&T areas through identifying new technology that may have high potentials for the growth of national wealth and betterment of the quality of human life – and their implementation into the National 5 Year S&T Basic Plan.
Taiwan

In Taiwan, there were several attempts to start a national Foresight activity, but until now there has not been any project with a direct link to policy-making. Nevertheless, Foresight/Futures Research is taught, e.g. at the Tamkang University, and the students, who have taken part in the courses, “infiltrate” the system with futures thinking.

Thailand

Thailand has performed its own Foresight studies but is mainly connected to the virtual APEC Center for Technology Foresight located in Bangkok, Thailand. It performs large scale projects to gain overviews and provides information to participating countries and performs specialized studies on selected topics and issues. “The Futures of Low-Carbon Society Climate Change and Strategy for Economies in APEC Beyond 2050” is a large activity which includes scenarios and a Delphi survey. It encompasses participants from Thailand, China, Japan, New Zealand, Russia, Singapore, and Vietnam.

U.S.A.

"Key Technologies Reports“ were performed from the 1990s (for an overview see Popper and Wagner 2003) until 2001. This was even requested by law. Meanwhile there are different Foresight activities but most of them find rather diffuse ways into policy-making. The majority of recent studies or processes are “roadmaps only” for the different ministries. On the other hand, the private sector is especially active in performing “corporate Foresight” for its own purposes.

Other countries

Countries like New Zealand, Vietnam or Malaysia also have interesting approaches but the material is unavailable or no insider knowledge can be found to assess the approach and its effect on policy-making. Singapore just started smaller exercises in Foresight but not yet on a larger scale but their Horizon Scanning approach is broad. A lot can also be learned from Russia, where there is a large unit at the Higher School of Economics performing Foresight – but this is Europe and not in the focus of this study.

ANALYSIS: DIRECT AND INDIRECT USE OF FORESIGHT

Analysing the links to and applications of Foresight results and processes in policy-making, we can differentiate between more direct and more indirect forms of applying Foresight results or processes. The following forms were observed (summary in table 1):

a) Direct: „Master Plan“, planning

We find direct applications of results in so-called "Master Plans" or long-range plans. This way of planning was performed in many socialist and communist countries based on forecasting and prognosis. Nowadays, Foresight with broader methodologies has found entry into this way of preparing a master plan. A country example is China: Foresight has a direct influence on the master plan and topics are directly used and taken over for the five-year-plans of the country.

In Europe, we do not have this direct top-down planning.
b) Direct: Framework Programs

A direct use of Foresight in a kind of framework program can be observed in Japan: A Basic Law on Science and Technology exists, from which changes of the national Basic Plans in science and technology are derived. They are five year plans, similar to EU Framework Programs, but no fixed Master plans as in China. The data and results of the national Foresight activities are directly integrated and used. They are also used to formulate “visions” which are guiding policies for different sectors during the following years.

c) Direct: filtering in new topics for (organizations) portfolios

Nearly all countries selected perform Foresight on the national level with the intention of adding new topics to the portfolio, e.g. Japan: here, the results of identifying, assessing and describing new single topics, broader issues, scenarios and their societal context are directly handed over to the relevant policy-makers and to the government via its Council for Science and Technology Policy. The results are also discussed with responsible actors on the regional or local level.

In China, new topics are directly added to the Master Plan.

In South Korea, new fields and topics are identified and handed over to the NSTC (National S&T Council), directly informing the Ministry of Science, ICT and Planning; additional/complementary Foresight processes are performed in different ministries. In 2006 for example, about 21 Key Technologies were identified and added to the budget plans.

In Europe, we find several attempts to identify and add new topics, e.g. the German BMBF Foresight is also supposed to add new topics to the portfolio of the German Federal Ministry for Research and Education, the French Key Technologies approaches select the most promising ones or the Swedish or Finnish approaches identified issues specific to their countries.

d) Direct and indirect: informing a specific commission

In some countries, we find specific commissions, councils or regulatory committees, which are in-between the researchers, who perform Foresight studies, and policy makers. These commissions have an entrance and filtering function. A very interesting example is Japan: The Council for Science and Technology Policy (CSTP) is a high ranking committee led by the Prime Minister himself. Foresight is directly presented to the CSTP, the ministers and people from industry directly use the reports and results further on.

South Korea: Similar to Japan, a National S&T Council (NSTC) exists, co-chaired by the Prime Minister and a "civilian", directly informing the Ministry of Science, ICT and Planning.

In Europe, we rarely find this direct link of Foresight and futures information and policy-making. One example is Finland, where a Committee for the Future belonging to the Finnish Parliament has been established and until now has involved the Prime Minister directly.

e) Direct and indirect: coordination alignment

A sometimes direct but mainly indirect influence on existing and upcoming debates and communities can be observed through Foresight. When topics emerge in Foresight processes, other actors (not those who have been directly aimed at) drop in the discussion and take over the topic, contribute to the issue, promote something or coordinate a new network based on the topic. This can be observed in every country but is especially relevant and observable over time in Japan (Cuhls 1998, 2010). In these cases, the topics have a kind of alignment function so that over time, the topic turns from a new, emergent topic into a mainstream idea. In Germany, we observe this with the topic of Human Technology Interaction from the BMBF Foresight Cycle I (see Cuhls et al. 2009).

f) Indirect: awareness-raising

In all countries analysed, there are attempts at awareness-raising, at raising attention for certain issues or at providing Foresight results just as at providing information in different forms, e.g. the Australian DSTO Study was a direct reaction to a White Paper in order to raise awareness about the breadth of upcoming challenges for Australia in the security field. Different from the alignment function, it is here
the attempt of certain actors in the ecosystem of innovations who purposely raise the awareness –
sometimes just for thinking ahead in general. Other examples are: The "Innovation 25 strategy" in Japan
started with a paper on demand-driven innovation fields and described future situations in form of
scenarios to raise awareness by and in different groups of actors, especially by policy-makers but also
industry. Translating the scenarios of Innovation 25 into Manga (comics) was the next step for reaching
out a possibly younger target group.

In Europe, awareness-raising is often a task in Foresight, and puts some topics on the agenda, e.g. in
Germany "Ageing Research" or "Time Research" from the BMBF Foresight or "Obesity" in the UK
Foresight. In the FOREN network, awareness-raising was even declared one of the general objectives of
Foresight on the regional level to make these actors aware of topics others might already have known.

**g) Indirect: service**

To make other actors aware of things to come is one aspect but some approaches, e.g. in Germany, go
further: In the Federal Ministry of Research and Education, the Foresight Process is regarded as an in-
house service of the Strategic Department to the Special Departments (Fachreferate), raising awareness
for long-term issues and just informing different groups of actors. In Japan, Foresight is regarded as a
service for the government and the companies of the country. Thus, from the beginning, all data from the
Delphi surveys were published so that companies can make use of them (as in the first German Delphi

**h) Indirect: teaching and training**

In some countries, there are only few concerted Foresight activities for the government or the public but
nevertheless, there is a lot of information about Foresight, Futures Research, Futures Studies and other
futures-related activities available. For example Australia has a Foresight Program in the Swinburne
University of Technology designed by Prof. Richard Slaughter that tried to influence policy-making by
educating persons and giving them the knowledge to make use of the different methods available and
thus influence the system. Also in Taiwan, teaching is observed to be fruitful (i.e. Tamkang University).
In Europe, there are only few universities/ colleges teaching Foresight and most of them are rather new
(e.g. Finland Futures Academy, Turku; or Futures Research at the Freie Universität Berlin etc.)

**i) Attention of media/publication**

Nearly all public Foresight activities try to gain the attention of the media and publish the results. Japan
has the longest experience of publication and using the media. Japan has classical reports as a first
output, but already experimented in the 1990s with easy-to-read publications for everybody, English
translations and Manga (comics), included in books and presentations to illustrate the issues. As media
have an influence on policy-makers and the opinions of citizens, this is the most direct way. Gaining the
attention via new media is regarded as more difficult, diffuse and time-consuming – and often beyond the
attention range of policy-makers.

In Europe, we have the whole range of publications and trials to gain the attention of the media.
Germany experimented with comics but at the time they were not yet so popular, and therefore met with
criticism. More and more, also pictures are used (e.g. EU OSHA 2013 or Behlau et al 2010). Table 1
summarizes the country findings.
<table>
<thead>
<tr>
<th>Policy Application</th>
<th>Country examples non-European</th>
<th>Country examples European</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
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</tr>
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</tr>
<tr>
<td>direct and indirect: coordination alignment</td>
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</tr>
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<td>indirect: service</td>
<td>Japan, South Korea, China</td>
<td>German BMBF Foresight Process as an in-house service of the Strategic Department to the Special Departments (Fachreferate)</td>
</tr>
<tr>
<td>indirect: teaching</td>
<td>Australia: the Swinburne University of Technology has a Foresight Program or Taiwan (Tamkang University).</td>
<td>Finland Futures Academy, Turku; Futures Research at the Freie Universität Berlin, Germany etc.</td>
</tr>
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<td>attention of media/publication</td>
<td>all countries, Japan has the longest experience of publication and using the media</td>
<td>all Foresight countries</td>
</tr>
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</table>

Figure 1 can roughly give an image of the different countries’ Foresights in their respective innovation systems. The breadth of participation (involvement of laymen, different actor groups, persons with different backgrounds) is on one axis, the second axis differs between direct (direct plans) versus more
indirect implications (diffusion of the results, informing policy-making). The size of the bubbles has no meaning in this picture. European and non-European countries are both included.

Figure 1: Breadth of the Foresight approaches versus application in policy-making contexts

1 The size given to the countries is in accordance with the GDP in the year 2013.
HOW FORESIGHT CAN MAKE A DIFFERENCE: EXAMPLES FROM EUROPE AND BEYOND

The Foresight experiences made over the past decades offer a wide spectrum of options how to improve decision-making and make it more forward-looking. Ultimately, however, Foresight must make a real difference in terms of the decisions that are taken and the choices that are made. There are several examples that allow demonstrating the value-added of Foresight for decision-making.

An interesting case is Japan where Foresight is transferred via different ways and media to the different addressees, even with the help of Manga. With 50 years of experience, they are the most experienced foresighters and can trace their historical data back to 1972.

Example Japan: Innovation 25 Strategy 「イノベーション25」

When Prime Minister Koizumi asked for "innovation" in parliament, he received no answer. This was the starting point for the accumulation of a paper called "Innovation 25" which directly used Foresight results, especially the regular Delphi survey. The rather short theses form that is normally used in Delphi surveys was enhanced, the topics explained in more detail and scenarios for the public even in the form of Manga were written. The information widely circulated in and via the Council for Science and Technology Policy (CSTP) and a national Innovation 25 strategy derived from it.

Recent experiences made in Thailand forcefully demonstrate the negative consequences of not taking Foresight results seriously, and thus stress the potential of Foresight for getting prepared for the seemingly unlikely.

Example: Thailand Scenarios on Climate Change

In the Foresight of Thailand, scenarios on climate change were derived from different indicators, a Delphi survey and discussions in workshops. The workshops were very important to estimate potential impacts of a climate change in Thailand. In one of the scenarios, rising water levels and floods including their direct impacts were an issue. It was assumed that in very short time after floods riots would occur. Many people thought that this scenario would be very improbable and accused the authors of being unrealistic. Only a few months after the foresight was published, strong rainfall led to floods in Thailand with many people dead – the cascade of the early consequences (e.g. riots) could tragically be read in the report. People were unprepared.

There are also some interesting examples from Europe, showing that Foresight did have an impact on important choices in society and government. The UK Foresight triggered the launch of a major campaign for raising awareness of the consequences and reasons of obesity, and the German BMBF Foresight led to the establishment of a new thematic priority and a corresponding organisational change in research policy.

Example UK: Tackling Obesities

In the UK Foresight, obesity was identified as an increasing problem, especially in the UK. An Obesity System Atlas linking different factors and influences was drawn and the impacts evaluated. Scenarios were formulated to address the longer-term effects. Based on the reports and findings a campaign in schools, universities and other places started for awareness-raising, with education and other measures.

Example Germany: Topic Human-Technology Interaction derived from the BMBF Foresight Cycle I

In the German national Foresight of the Federal Ministry of Research and Education (BMBF), a broad search for long-term interdisciplinary topics in research was performed from 2007 to 2009. One of the results was the topic "Human-Technology Cooperation", recommending very different actor groups to cooperate in order to foster the topic into a fruitful direction for innovations, regulated and also taking ethical issues into account. Based on this foresight, the division (Referat) 524 "Demographic Change and Human-Technology Cooperation" (now "Interaction") was established in BMBF with the task of identifying new concepts and funding R&D projects in the field – meanwhile running a diversity of projects.
There are also some good historical examples of the power of foresight for getting prepared for a changing world. Royal Dutch/Shell has a good track record in anticipating events and developments that might seem unlikely at a first glance, but which – if they materialize – might change the business in the oil industry.

**Famous examples from the past: Foresight in Industry - Royal Dutch/Shell and the oil crisis**

In the 1980s Shell maintained its reputation for using scenario thinking as part of its planning system, two famous examples are (Schwartz 1991):

- Oil would become a commodity with prices set by the market, not by either the companies or the producers. Prices would thus behave like those of commodities like nickel, copper and wheat. Once oil began indeed to act like other commodities, Shell had designed an oil trading system so was once again in pole position compared to its rivals.

- Oil and gas prices could drop. With oil, OPEC’s unified facade could crumble, worsened by a slowing demand for oil because of better energy conservation and efficiency. Even more strikingly, the continuation of the Soviet system was not assured, which could have implications for the natural gas market. Shell avoided investing in new oil fields or following the acquisition trail being trodden by its major competitors, who were engaged in an acquisition spree, buying other oil companies at premium prices. Once the dust had settled following the price drop, Shell was able to pick up additional assets at bargain prices.

**LESSONS LEARNED**

We have to be aware that a lot of Foresight is already going on in Europe, on the national levels,

Even if the number of selected non-European Foresight activities is limited, there are some commonalities in factors that contribute to the success of a Foresight for policy-making, and some lessons can be learned.

There is no model of Foresight that fits all purposes and backgrounds. Diversity of and adaptation to objectives are important. But the interfaces between the methods applied and the target group, the policy-makers, need special attention. For this, a strong coordination unit (e.g. a department in a ministry or a research organization) and entrance point into the decision-making processes is one of the strengths of successful Foresight processes observed especially in East Asia and Australia. The lesson to be learned is that for the European Commission such an entry point located directly in the European Commission seems to be essential. The function of such a department in successful countries was identifying the right addressees as decision-makers and convincing them and gaining long-term support (broker in the system). But also in non-European nations, Foresight is not exploited fully – often the findings are ignored or there are no means to transfer them to policy-makers. Often, the timing is not suitable for the transfer.

Networking and coordination efforts seem to be strong points especially of Asian Foresight activities, which link Foresight organizers, experts and the decision-making processes. This means for the EC: A strong external and internal “network” of the coordination unit is needed, which has to be built up and maintained, including Foresight organizers and experts (individuals, advisory groups, councils) as external contributors and decision-makers (promoters of topics, internal commissions).

A Promotor for the Foresight Activity is found in many of the selected Foresight activities. This kind of active ambassador has an understanding of the activity and direct connections to the innovation and policy eco-system. In Asian countries, we have often found high ranking, visible persons who support the activities or single topics. The Promotor can be a single, influential person (powerful by rank or position, visible, well-known or just a good networker in the system) and/or an institution in the eco-system with a direct link to those who should become active.

A high ranking Science, Technology and Innovation Council (like a High-level Group, cross cutting, with an advisory character) is established in some of the selected countries, and - as the cases from Japan and South Korea show – can be very successful. In Japan, the Foresight group of the National Institute of Science and Technology Policy (NISTEP) reports directly to the highest level advisory...
commission, the Council of Science and Technology Policy (CSTP). The CSTP consists of members from Ministries, from industry but also the Prime Minister himself.

A **coordinating institution** for the different studies is obviously helpful. In the virtual APEC Center for example, different countries are brought together and coordinated to perform Foresight on specific issues or topics and bring the results back to the responsible positions in the national systems of innovation but also to publish the results as lessons for all countries.

A **centralized, institutional use for Foresight** is observed in some countries. In China for example, a very central master plan exists, which cannot be an ideal for the EC, but the Japanese and South Korean Five-Year-Plans, which are designed according to their specific Basic Laws for Science and Technology, may be a model as they are rather flexible frameworks with budgets that may be changed over time and which are thought through every 5 years. In the EC, the equivalent would be Horizon 2020 and the following Framework Programs, which can be regarded as integrative but which can use much more information (strategic intelligence) and knowledge from the existing and jointly performed Foresight activities. In the European Union, Germany is also learning to integrate its Foresight results (e.g. of the BMBF Foresight) more into a strategy, in this case the existing Hightech Strategy which is less centralized and much more open than the Asian approaches.

In APEC countries, the national activities are regularly compared and some joint activities are performed (China, Japan, South Korea). Additionally, issue-specific joint activities which integrate several (not all) countries add specific information and promote more specific policies. Some regular activities in Foresight are conducted (as the Delphi surveys in Japan every five years) which might be helpful to receive historical lines of data and learn from this information. A lesson for the EU can be that a **joint EU effort** for getting an overview of things to come (challenges, disruptions, societal and other developments included) can serve this purpose.

**General knowledge** about the pros and cons of Foresight and its methodology are more and more spread in non-European countries, as well as Futures Literacy and the capacities – having a critical mass of persons with the ability to think long-term, the knowledge of methods and what is feasible as well as the personal capabilities to free one’s own thinking from the limitations of existing time frames and deadlines. This is only possible by **education, regular training** (see Australia or Taiwan) and updating as well as the establishment of training facilities, even at universities (as Futures Research or integrated into other faculties) – and policy-makers need to be informed about it. Until now, there are only few education facilities offering this knowledge in Europe.

**Time and institutional stability** are important factors to build up the capacity in Foresight and futures thinking – and to monitor the challenges and issues observed. Operationalization plays a role in bringing the knowledge into the system and having trusted and known ways to transfer futures knowledge to the right place and the right person in the system – at the right time. Time is also needed because long-term developments take time, do not fit into policy cycles of 4 to 5 years, and so they are not decided on the spot but with a time-lag. Patience for these new developments which become visible much later is needed and evaluations have to consider this time-lag too. New forms of evaluation are still in development. The long-term experience in Japan shows that tenacity (especially of the performing institutions and the coordinators) is an important factor to reach the relevant decision-makers.

Many Asian countries have strictly hierarchical societies and innovation systems (especially China, Japan and South Korea). When results from Foresight and new Foresight workshops in the region were performed, the communal participants (including the government) appreciated the possibility of having some freedom to think and speak freely. The lesson to be learned here is: **Create “spaces” for new thinking and Foresighting**, e.g. using existing ones, conferences, regional events, issue-related events, but also new platforms, meeting places and single opportunities. This helped to enhance the time horizon for thoughts and interdisciplinary discussions – in some cases even together with decision-makers.

Another lesson learned from especially Australia and Japan is that not in all cases, only **monetary funding** is fruitful, but the “moderation” and bringing the “right actors” together in one place and at one time has a large effect. Nevertheless, all cases show that without any **budgeting** in the end, an incentive is missing. In the Asian cases, entering topics into the Five-Year-Plans is this incentive; entrance into Horizon 2020 and following programs might be the equivalent in the European Union.
RECOMMENDATIONS

The key for a successful Foresight to policy link is an institutionalized centralized Foresight capacity as a promoter for Foresight activities with a clear built-in entry point that can serve the function of a “broker in the system” like in the UK or the German BMBF Foresight. The broker needs in-house and external links and has to be acknowledged in the hierarchy of the organization.

Networking and coordination as well as connecting the networks in order to achieve a joint Foresight effort to reach different actors in the innovation system including other players who are rarely involved in other cases (multilevel approach) needs to be enhanced.

A Foresight culture to enhance the absorptive capacity has to be built up. This was already a recommendation from EFFLA.

A Promotor for the Foresight Activity is needed. This kind of active ambassador needs to have an understanding of the activity and have connections to the innovation and policy eco-system. In Asian countries, we have often found high ranking, visible persons to support the activities or single topics. In the European Commission, this “personal” role can be taken over by a Senior Advisor in the Commission, a kind of “Chief Scientist”, or even the personal advisor to the Commissioners or the President.

A high ranking Science, Technology and Innovation Council (High-level Group, cross cutting, with an advisory character) could also be helpful as the cases from Japan and South Korea show, where the Foresight group of NISTEP reports directly to the CSTP, which consists of members from Ministries, from industry but also the Prime Minister himself. Members of the Council do not necessarily be high in functional rank but need to be respected because of their (fore-) knowledge.

A coordinating institution for the different studies in the EU is needed (similar to the virtual APEC Center for example). This can definitely be the role of the Department Policy Analysis, Foresight and Data but needs to be supported by other departments and project-input from all over the European Commission.

A centralized, institutional use for Foresight can be recommended. This should not be a fixed Master Plan like in China. Instead, in the EC, Horizon 2020 and the following Framework Programs should be regarded as integrative but should use much more information (strategic intelligence) and knowledge from the existing and jointly performed Foresight activities.

A joint EU effort for getting an overview of things to come (challenges, disruptions, all kinds of signals, societal and other developments included) should be actively promoted. Additionally, issue-specific joint activities which integrate several (not all) European countries can add specific information and promote more specific policies. Some regular activities in Foresight might be helpful to receive historical lines of data and learn from this information.

General knowledge about the pros and cons of Foresight and its methods should be communicated and futures literacy should be supported. This is needed to achieve a critical mass of persons who have the ability to think long-term, information about Foresight methods and what is feasible as well as the personal capability to free their thinking from the limitations of existing time frames and deadlines. This is only possible by education, regular training and updating as well as the establishment of training facilities, even at universities (as Futures Research or integrated into other faculties) – and policy-makers need to be informed about it. Until now, there are only few education facilities offering this knowledge in Europe which is not enough.

Time and institutional stability need to be given to overcome the 4 to 5 years that are typical cycles in elections and policy-making changes. New forms of evaluation have to be developed actively. Tenacity (especially of the performing institutions and the coordinators) is needed to:

Create “spaces” for new thinking and Foresighting, e.g. using existing ones like the Innovation Convention, conferences, regional events, issue-related events, but also new platforms, meeting places and single opportunities. This will enhance the time horizon for thoughts and interdisciplinary discussions – if possible together with decision-makers. Until now, there are only few education facilities (e.g. in Finland, Germany, Italy, UK) offering this knowledge in Europe.

Although the “moderation” function and bringing the “right actors” together in one place and at one time is in the forefront of Foresighting, sufficient and continuous budgeting is necessary – also as an
additional incentive. Entering topics into Horizon 2020 and following programs might have an incentive function in the European Union.

The recommendations are summarized as follows by RISE:

- **Make full use of Foresight processes and their results that are available throughout Europe – for being alerted, for strategy-building, and for being prepared anticipating different futures.**
- **Ensure the tight institutional embedding of Foresight in the EC, by designating a centralized capacity with clearly defined responsibilities in the policy-preparing processes, backed up by high-level support.**
- **Connect the EC-internal Foresight network tightly to national and international communities in order to increase the efficiency of Foresight for policy-making, and to reach out to different actors and players in the innovation system.**
- **Training and experiencing Foresight is key to the emergence of a Foresight culture and to enhancing the absorptive capacity for strategic knowledge.**
CONCLUSIONS

This study about countries outside Europe clearly underpins earlier recommendations from EFFLA (see different Policy Briefs of EFFLA and Andrée 2015). As an institutionalized setting, a first step towards an entry point and a kind of node for using Foresight and forward-looking activities for policy-making in the European Commission has been made by the establishment of the Unit A6: Policy Analysis, Foresight and Data in DG RTD. Its functions in the system can still be broadened towards an internal and external network broker.

Further steps can be the establishment of a high level council to approve and support Foresight projects as well as promoters to diffuse the contents. Building up an understanding of Foresight as well as competencies to absorb the potentials from forward-looking activities are continuous tasks.

Other lessons learned cannot be transferred into recommendations for the European Commission (e.g. direct transfer of topics from Foresight into a kind of master plan) as the setting is different here, especially the governance structure and the underlying culture.

But some lessons are new or give us new perspectives on existing observations, e.g. the necessity of an entry point into the system, the role of a high level council or regulatory committees as anticipator and distributor of Foresight results as well as their political back-up or the role of individual promoters in the system. Infiltrating the system by well-educated people and building up the absorptive capacity on the policy-makers’ side by education and training is another possibility that became much more visible in other countries than in Europe.

Permanent external networking with Foresight experts of all kinds has to be developed as a “culture”: Time and institutional stability are needed to build up this capacity in Foresight and futures thinking in the organization and the policy processes so that monitoring the challenges and tackling issues observed are a normal task that reaches decision-makers. Foresight management and a Foresight culture play a role in bringing the knowledge into the system and having trusted and known ways to transfer futures knowledge to the right place and the right person in the system – at the right time.

Time is also needed because long-term developments take time, do not fit into policy cycles of 4 to 5 years, and so they are not decided on the spot but with a time-lag by policy-makers. It is important to start planning for the next Framework Programme after Horizon 2020 was taken up in several Policy Briefs of EFFLA in 2012 and 2013. Patience for these new developments which become visible much later is needed and evaluations in new forms have to consider this time-lag, too. The long-term experience in Japan shows that tenacity (especially of the performing institutions and the coordinators) is an important factor to reach the relevant decision-makers.
REFERENCES

APEC/ Thailand

APEC Center for Technology Foresight: The Futures of Low-Carbon Society: Climate Change and Strategy for Economies in APEC Beyond 2050, Bangkok 2010

APEC Center for Technology Foresight: Report of Delphi Analysis for the Low-Carbon Society Beyond 2050 project, Bangkok 2010

APEC Center for Technology Foresight: The 2050 Scenarios. Low-Carbon – High Quality Lifestyles, Bangkok 2010

Damrongchai, Nares and Sripaipan, Chatri: Ten Years of International Foresight: the Learning Experience of APEC Center for Technology Foresight, unpublished paper, Bangkok 2014

Australia

Australia and New Zealand Horizon Scanning Network (ANZHSN), Bulletins, www.horizonscanning.gov.au (access 1/10/2014)


Science and Technology for Safeguarding Australia (DSTO), Australian Government, Department of Defence (Eds.): Forward 2035. DSTO Foresight Study, authors: Boey, Seng, Dortmans, Peter and Nicolson, Joanne, Commonwealth of Australia 2014, p. 2


Japan


NISTEP (National Institute of Science and Technology Policy) (2005a), The 8th Science and Technology Foresight: Study on Social and Economic Needs, NISTEP Report Nr. 94, Tōkyō: NISTEP.

NISTEP (National Institute of Science and Technology Policy) (Hg.) (2005b), The 8th Science and Technology Foresight: Study on Rapidly-developing Research Area, NISTEP Report Nr. 95, Tōkyō: NISTEP.

NISTEP (National Institute of Science and Technology Policy) (Hg.) (2005c), The 8th Science and Technology Foresight: Scenario Analysis, NISTEP Report Nr. 96, Tōkyō: NISTEP.

NISTEP (National Institute of Science and Technology Policy) (Hg.) (2005d), The 8th Science and Technology Foresight: Delphi Analysis, NISTEP Report Nr. 97, Tōkyō: NISTEP.

NISTEP (National Institute of Science and Technology Policy) (2009), Emerging fields in Science and Technology for the 4th Science and Technology Basic Plan, NISTEP Research Material Nr. 168, Tōkyō: NISTEP.

NISTEP (National Institute of Science and Technology Policy) (2010a), Contribution of Science and Technology to Future Society: Summary on the 9th Science and Technology Foresight, NISTEP Report Nr. 145, Tōkyō: NISTEP.

NISTEP (National Institute of Science and Technology Policy) (2010b), Kagaku Gijutsu no Jōkyō ni kakaru Sōgōteki Ishiki Chōsa [Survey on the consciousness about the general situation in science and technology], NISTEP Report Nr. 136, Tōkyō: NISTEP.


NISTEP (National Institute of Science and Technology Policy) (2010d), The 9th Science and Technology Foresight – Contribution of Science and Technology Policy to Future Society: Future Scenarios Opened up by Science and Technology, NISTEP Report Nr. 141, Tōkyō: NISTEP.

NISTEP (National Institute of Science and Technology Policy) (2010e), The 9th Science and Technology Foresight – Contribution of Science and Technology Policy to Future Society: Capability of Local Regions for the Green Innovation, NISTEP Report Nr. 142, Tōkyō: NISTEP.


New Zealand


South Korea


South Korea


Thailand


Vietnam


U.S.A.


European Forum on Forward Looking Activities (EFFLA)


- (EFFLA, 2013): Important issues in the design of the Research and Innovation Agenda to address the Grand Challenges: Main points from EFFLA Policy Briefs 3-8, Policy Brief no. 9, Brussels; http://ec.europa.eu/research/innovation-union/pdf/expert-groups/effla-reports/effla_pb9_-_important_issues_in_the_design_of_the_research_and_innovation_agenda.pdf (access 10/11/2014).


Other References


ANNEXES

These annexes contain templates that were filled in by experts from the different countries, in most cases persons who were responsible for the Foresight activities or who are doing research on it. They include general summaries and sometimes “insider knowledge” that is unpublished. Other annexes are the summary of an interview.

Annex 1:

Important Model from the European Forum of Forward-Looking Activities (EFFLA)

In the 2nd PB (How to design a European foresight process that contributes to a European challenge driven R&I strategy process) recommendations were followed up with concrete advice on the implementation process in four steps:

- Gathering Strategic Intelligence,
- Sense-making (this will reveal any gaps there might be in strategic intelligence),
- Selecting Priorities and the
- Implementation.

The Sense-making step being the real new element needed inside the Commission to complement the already existing steps on priority setting and implementation using what is mostly already done in strategic intelligence. In addition different timelines were identified: Long-term (15-17 years), e.g. next Framework Programme, Mid-term (4-5 years), e.g. focused intelligence and sense-making as well as experiences drawn from implementation and monitoring to feed into Horizon 2020.
Annex 2: Short Description of Foresight Activities

Europe

Finland

Description by Osmo Kuusi, University of Turku/ former SITRA, Turku 2014

Name of the Process(es): Futures of the Finnish Healthcare and its background projects

Year and Duration of the Process(es): 2000-2006

Financed by: Committee for the Future, the Parliament of Finland

Operated by: Committee for the Future and its scientific adviser; Technical Research Centre of Finland; Faculty of Medicine, University of Turku; Department of Health and Social Management, University of Kuopio (recently the University of the Eastern Finland)

Participation: The background of the main process was other foresight processes performed by the Committee for the Future during the years 2000-2004, especially the project of Gerontechnology (2000-2001) and an Argument Delphi study concerning Human Genome and Stem Cells (2002-2003). Besides 27 Finnish key experts of the human genome and stem cell technologies, experts from the US National Institute of Health (NIH) participated in the Argument Delphi process.

The main foresight process was conducted 2004-2006. The Chair of the Steering Group of the project was Jyrki Katainen, the Chair of the Committee for the Future. He was the Prime Minister of Finland 2011-2014. Nearly all key politicians involved in the reform process of the Finnish healthcare system during years 2011-2014 participated in the foresight process either as members of the Steering Committee or as members of the Committee for the Future. Besides them, 40 key administrators, researchers, health care professionals and representatives of patients participated in the Argument Delphi process.

Thematic Focus: Finland belongs to those EU countries, in which the aging of the population is proceeding especially rapidly. It was anticipated in 2004 that the challenges for health care will be big already in 2015 but especially in 2030s when the big cohorts of after Second World War born generations are in their eighties. It was considered that it is highly important that the Finnish health care system is able to manage those challenges taking into account the rapid development of technology.

Objectives: Main stages of the foresight process and their objectives

- Preliminary study looking for main challenges of the Finnish health care system made by researchers of the Kuopio University and the scientific adviser of the Committee for the Future.
- Evaluation of the importance order of the challenges: the Steering Group and the Committee for the Future.
- How to organize the health care system to meet the challenges: Argument Delphi foresight process of carefully selected healthcare experts resulting in four possible strategies or road maps towards 2015 (the planning horizon) and scenarios towards 2030 (the futures mapping horizon). The alternative road maps and the futures map took into account prospects of technological development and different interests of stakeholder groups.
- The Committee for the Future accepted a statement concerning the healthcare in 2015 that included a rather detailed suggestion/road map how to organize the regional health care system of Finland.

Users: Various developers and stakeholders of the Finnish healthcare system, especially key actors of the Finnish regional healthcare reform

Experiences in implementation: Already before the foresight process, it was evident that there were conflicting interests in the regional management of the Finnish health care. Based on the foresight process, the Committee for the Future, however, suggested a bold road map that was not a widely realized action plan before. It took into account both the new technological opportunities and various interests of the key stakeholder groups. In the Committee that represented different parties of the Finnish Parliament just one MP was not ready to accept the “thought experiment” of the Committee.
After the parliamentary election in 2011, the coalition government of Finland tried to proceed following another road map described in the foresight process. It was a road map that was in favor of big or middle size towns where most voters of the coalition government parties lived. Unlike the “thought experiment” of the Committee for the Future, the action plan took rather poorly into account the technology based challenges of individualized or even personalized medicine broadly discussed during the foresight process.

In March 2014 the long prepared healthcare reform was in a dead-end situation both because of conflicting opinions and juridical problems. Then suddenly, an opposition leader suggested that the solution could be the “thought experiment” of the Committee for the Future. In a couple of days, most politicians and healthcare experts accepted this action plan which gave main independent organizing responsibility to five big areas of 0,5 – 1,5 million people. It is very probable that the Parliament of Finland (“Eduskunta”) will accept the law based on this action plan still during the year 2014.

Germany

Dr. Kerstin Cuhls, Fraunhofer Institute for Systems and Innovation Research, Karlsruhe, Germany, 2014

Name of the Process(es): BMBF Foresight Process Cycle I and II


Financed by: Federal Ministry of Research and Education (BMBF), Germany

Cycle I

Operated by: Fraunhofer Institute for Systems and Innovation Research (ISI) together with the Fraunhofer Institute for Industrial Engineering (IAO), the Technical University Berlin, Faculty VII, Innovation Economics, and other partners like the RWTH Aachen or other Fraunhofer institutes.

Participation: varied according to the methodology used. Topic coordinators (with an overview on the specific topic) were responsible for the different fields, experts were included in expert workshops; conferences had 150 to 230 participants, an online survey included 3000 experts with more than 1200 responding. The participants came from different disciplines and fields, from academia, industry, research associations, other associations, NGOs, and wherever knowledge could be found.

Thematic Focus: Open search for topics from science and technology with a long-range option in research (10-15 years and more) starting with 14 HighTech strategy fields, later on describing them more in depth for 14 Established Future Fields and 7 New Future Fields.

Established Future Fields:

- Health Research
- Mobility
- Energy
- Environmental protection and sustainable development
- Industrial Production Systems
- Information and Communication Technologies
- Life Sciences and Biotechnology
- Materials and production processes
- Nanotechnology
- Neurosciences and Learning Research
- Optical Technologies
- Services Science
- Systems and Complexity Research
- Water Infrastructures

**New Future Fields:**

- Human-Technology Cooperation
- Ageing Deciphering
- Sustainable Living Spaces
- ProductionConsumption2.0
- Transdisciplinary Models and Multi-Scale Simulation
- Time Research
- Sustainable energy solutions

**Objectives:**

- Identifying new research and technology focuses,
- Identifying (and deriving) areas of activity covering a range of research and innovation fields,
- Analyzing potential fields of technology and innovation in which strategic partnerships might be possible,
- Deducing priority areas of research and development activity.

**Users:** The major user of this process was BMBF (Federal Ministry for Education and Research) itself. It even established a new division (Referat 524) directly on one of the topics recommended in the process. The division is called Demographic Change and Human-Technology-Interaction.

Strategic Dialogues in BMBF and with a limited number of external experts were performed.

Other users were industry who could only use the experiences from participation in conferences or workshops, and the final reports.

A chair at a university was renamed to Human-Technology-Borders in-between the process (before the end of the process when the topic was renamed again). In fact everybody could make use of the results. They were provided in internet for free download (see all reports on www.bmbf-foresight.de).
A summary is:

1. Varied impact on agenda setting in research and innovation policy
   - Development of **horizontal and interface topics** which are not addressed in mono-disciplinary approaches, such as human-technology cooperation
   - BMBF has assumed a **pioneering role** during the course of the process
   - Identification of **new topics**, such as producing/consuming (PC 2.0), chronobiology

2. New ideas for specialist divisions at the BMBF
   - Internal service provider for divisions (reflect their foresight activities, address new topics)
   - Cooperative interministerial work on the field ProducingConsuming2.0 in five BMBF divisions and BMU (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety), BMELV (Federal Ministry of Food, Agriculture and Consumer Protection) and BMWi (Federal Ministry Economics and Technology)
   - Establishment of BMBF division 524 “Demographic Change, Human-Technology Cooperation”
   - Further cutting-edge fields (aging, living spaces, energy) become part of the forward-looking projects of the Hightech Strategy of the German government

3. Broad reception and discussion of foresight results by the specialist public

**Experiences in implementation:** Implementation was a long way in this process and there are still a lot of opportunities open for new topics that were identified (including potential actors and strategic partnerships for the future). As the aim was to contribute to the portfolio of BMBF in science and technology, there are a lot of offers for contribution but in a state like Germany, it is up to the users to really exploit the existing material and knowledge.

As the process did not include BMBF persons directly in the process (during the process they were informed on different levels: divisions, strategic coordination group of BMBF, undersecretary of state, department heads…) it was necessary to inform the interested units in the ministry about the process results and to discuss with them what could be done later and how the results can be used. Therefore, there was a tour of presentations through the ministry (“bilateral talks”).

In addition, a few workshops with BMBF members were performed (e.g. for ProductionConsumption 2.0) to prepare the Strategic Dialogues that were supposed to follow and develop the topics further with the help of external experts.

But in most cases, it was left to the different departments if they wanted to take up the results of Foresight for their own purposes. The Foresight Process was regarded as an in-house service for the special departments, some of them used the results (mirror function – analyzing if they have everything on the screen or something is missing) or bringing in new interdisciplinary topics.

The New Future Fields were regarded with a lot of interest – but for implementation it was often too early or there was nobody in the system who could take up the idea because it was an interdisciplinary issue and did not fit into the current organizational chart of the ministry. In the end, often nobody felt to be responsible or wanted to give money from the own budget to support the topic.

Renaming, naming, wording was a lot of “translation” work to be performed during the implementation process: Often, the results could only be accepted if the names were explained or the result as such renamed (e.g. human-technology-borders became human-technology-cooperation and later on human-technology-integration). In some cases, one had to go a step back and use “old” names and formulations to be adaptive.

The results of this process still offer a lot of possibilities and – as happened with FUTUR, a previous process which is not mentioned, anymore - we might see the topics and new future fields on the agenda in 10 years, without referencing to foresight, anymore. The established future fields were already part of the governmental Hightech Strategy and the uptake will definitely be integrated into it.
Cycle II

Operated by: VDI-Technologiezentrum and Fraunhofer Institute for Systems and Innovation Research

Participation: In small workshops and an integrative workshop, experts with different backgrounds were involved. The major work was performed by researchers at VDI-Technologiezentrum, Future Technologies and Fraunhofer ISI.

Thematic Focus: Contrary to the starting point in science and technology for Cycle I, Cycle II started from the "demand side". There was an open search for societal trends with a long-term view (2030), including the search for hidden trends, for the results and an overview of the themes see http://www.bmbf.de/de/24519.php.

The second part of the thematic focus was an update of some of the 14 Established Future Fields from the previous cycle. The fields can be seen at http://www.bmbf.de/de/24521.php.

Objectives: The objective of long-term and demand-orientated strategy development is shared between the BMBF and many other governmental as well as private organizations. With its cyclical approach, which regularly alternates between "technology push" and "demand pull" perspectives, the BMBF has now developed its own foresight approach. A BMBF Foresight cycle consists of a two-year search and analysis phase as well as the transfer and the preparation of a new search.

Users: until now (2015) BMBF itself

Experiences in implementation: The process has just been finished, but there are already a lot of perceptions of the societal trends in BMBF and elsewhere. In BMBF intranet, the results were published relatively early to receive in-house feedback on the topics.

ITA, the Innovation and Technology Analysis of BMBF, performs a yearly conference and used the topics as an entrance point for new research. An ITA call based on some of the observed issues that are directly derived from the processes was launched.

Presentations were given in BMBF – until now not that exhaustively as in the first cycle.

Sweden

Description by Dr. Dan Andrée, Vinnova, Sweden

Name of the Process(es): Teknisk Framsyn (Technology Foresight)²

Year and Duration of the Process: 2003-2004, 10-15 year's perspective. A similar exercise was done the 1999-2000.

Financed by: Several agencies and organisations, as an input to public discussions on future priorities such as planned Government Research Bills.

The organisations behind the project were the Swedish Industrial Development Fund, the Royal Swedish Academy of Engineering Sciences (IVA), the Knowledge Foundation, the Swedish Trade Union Confederation (LO), the Swedish Business Development Agency (NUTEK), the Confederation of Swedish Enterprise, the Swedish Research Council and the Swedish Agency for Innovation Systems (VINNOVA), in close collaboration with the Swedish Government, companies, public agencies and other interested parties.

Operated by: A special panel was set up with 12 members from academia, industry and trade unions. The study was coordinated by Suzanne Håkansson, Ministry of Enterprise.

Participation: Panel members: Charlotte Brogren, ABB; Jan Edling, LO; Cristina Glad, Bioinvent AB; Ulla Grönlund, Swedish Institute for Wood Technology Research; Teresa Jonek, IVA; Thomas Malmer, IVA; Anna Nilsson-Ehle, Universeum; Lars Nyberg, NCR et al; Peter Nygårds, SwedBank; Göran Rosenberg, journalist and author; Anna Sandström, IVA; Börje Svensson, consultant; and Bengt-Arne Vedin, Mälardalen University.

Thematic Focus:

- Different expert panels were set up for the following areas:
  - New, Better and More Secure – IT in the Service of Future Society
  - The Production System – Engine of Swedish Prosperity
  - Materials and Material Flows – Challenges and Opportunities
  - Infrastructure for a Borderless Europe
  - Biological Natural Resources – A Swedish Strength for the Future
  - The Health Care of the Future – Advances and Challenges
  - Education and Learning
  - Inspiration for Innovation – Knowledge and Technology Looking Toward 2020
  - Other National Foresights
  - The Context of Technology

The project studied outside factors that could be of significance to growth and the development of knowledge in Sweden over the next 15-20 years. It focused on issues related to global restructuring and the influence that Eastern Europe, China, India and other parts of the world could have on production and R&D. The report also discussed demographic trends, globally and in Sweden, the increased importance of regions and the role of innovation systems.

Objectives: To explore conditions for technological and economic growth in a 10-15 year’s perspective.

Swedish Technology Foresight was a national project aimed at creating insights and visions about technological development over the next 15–20 years. The aim of the project was to promote the interplay between technological, institutional and social processes.

In 1999–2000, the first round of Swedish Technology Foresight was implemented. This included a thorough review of a number of important fields of technology. The lessons from the implementation of the first Swedish Technology Foresight was followed up on a continuous basis by an Evaluation Committee, which reported its observations and conclusions to the four organizations that ran the project. The project was run by the Royal Swedish Academy of Engineering Sciences (IVA), the Swedish National Board for Industrial and Technical Development (NUTEK), the Swedish Foundation for Strategic Research and the Federation of Swedish Industries. It was conducted in close cooperation with the government, companies, public agencies and other interested parties.

During 2003–2004, the second round was implemented. This round supplemented and built on the analyses made in the first round. In addition, it took a considerably broader, more societally oriented approach.

The purpose of Swedish Technology Foresight was to create an arena where people will have an opportunity to expand their thoughts a little further – to lift their ‘gaze’. Swedish Technology Foresight was a project in which some of the country’s foremost experts identified important technologies for our future. Its aim, among other things, was to strengthen the future-oriented work of companies and organisations, to promote sustainable growth and renewal in Sweden, compile information and design processes for identifying high-priority areas in which Sweden should build expertise. What are we in fact really good at in Sweden? Where and what should we invest in, to take the best advantage of this?

Users: Government/ politicians/agencies/policy makers

Experiences in implementation: Important factors identified:

The study concluded:

- We must once and for all decide that we are a part of a larger world. Increasing globalisation in production, trade, products, travel, lifestyles etc. will continue to change the fundamental

preconditions of our development. Counterforces to globalisation will also increase, and terrorism will create global vulnerability

- We have to prioritize and focus – high added value products – use industrial strength in Sweden. The knowledge society is becoming more prevalent. More and more, we are leaving behind the old industrial society and entering a society based more on information, knowledge and expertise.

- We must concentrate our efforts on future investments and initiatives – 100 different technological and scientific areas were identified divided into 11 clusters.

- We need to modernise the public commitment. Technology is reshaping society, and society is reshaping technology. In particular, developments in information technology (IT) and biotechnology will greatly change how we live and what we live on.

- We need to get better at taking advantage, evaluate and provide scope for each person’s skills, creativity and involvement. We are building ever-larger and more complex systems, which means greater vulnerability to operational disruptions, sabotage and global spread of infections.

- We need to take active steps to realise a sustainable society. Global climate change is deepening, and the long-term exhaustion of non-renewable energy sources will create new conditions and challenges.

These strategic choices above can be summarized as follows:

- Once and for all, we must decide that we are part of a larger world
- We must dare to prioritize and focus
- We must concentrate our resources on investments and projects
- We must modernize public sector commitments
- We must become better at utilizing, evaluating and allowing room for the skills, creativity and commitment of every individual
- We must take active steps to bring about a sustainable society

The part of the report by Teknisk Framsyn that discussed research issues was one of several inputs to the Government Research Bill 2004 (social democratic government). Teknisk Framsyn was presented in March 2004 and the Research Bill in March 2005. In the Research Bill there is a summary of the study but it is difficult to see the exact impact since it was more a basis for continued discussions between government and industry representatives. The areas identified in the report were never the less relatively similar to those proposed the Bill. The Bill had three main priority areas, Medicine, Engineering and Environment where the focus areas selected within Engineering were similar to those proposed by Teknisk Framsyn, partly due to those being identified there.

Ahead of the 2008 and 2012 Research Bills, where the emphasis were on quality and relevance of publicly funded research (conservative coalition government), no new Teknisk Framsyn was commissioned but Agencies and other stakeholders were given the possibility to give evidenced based input to the government.

Partly as a follow up of the earlier Teknisk Framsyn the Government formed in 2006 a Globalization Council to examine the question of how Sweden best could assert itself in an era of continuing globalisation and to make appropriate recommendations. Its final report ("Beyond the Crisis" Ds 2009:21, with several sub-studies on particular areas) was in the form of a foresight study. The Council was led by the Minister for Higher Education and Research (Mr Leijonborg), four other ministers and high-level experts. The final report was presented in 2009 and highlighted the need for more investment in Education and Research and had definitely an impact on the Research Bill 2012 which saw a substantial increase in R&D spending. The conclusions of this study have been used as a basis for continued discussion on future priorities.

In retrospect some of the areas taken up by the Swedish Technology Foresight, e.g. in the field of schools/education and physical infrastructure could have been utilised better in order to plan future needs in investment, e.g. regarding investment in future rail systems and the educational system.
In this context e.g. VINNOVA\(^4\) embarked on new process (2011): challenge driven innovations involving a large number of different stakeholders to identify action plans. These actions plans have been implemented since 2-3 years back.

VINNOVA, the Swedish Energy Agency and the Swedish research council for environment, agriculture and spatial planning (Formas) collaborate on the funding programme “Strategic innovation areas”\(^5\). The purpose of the venture is to create conditions for international competitiveness as well as to find sustainable solutions to global challenges for societies.

The idea is for industry, the public sector and academia to collaborate for common prioritizations in terms of investments in research, development and innovation, thus strengthening one another.

Within the venture there are two types of efforts:

Strategic research and innovation agendas – that aims to stimulate a strategic dialogue between actors so as to, through a joint research and innovation agenda, highlight areas for efforts and the needs and possibilities available. More than 60 agendas have so far been identified.

SIO programmes – that aims to support the implementation of the research and innovation agendas that are most important for Sweden. As well as those that have the greatest potential to create conditions for international competitiveness and to find sustainable solutions to global challenges for societies.

In summary one could say that the concept of ‘foresight’ in Sweden has developed from more formal foresight exercises to more integrated processes involving stakeholders. In this context the process itself is as important as the final result.

Outside Europe

Australia

Dr. Kerstin Cuhls, Fraunhofer ISI, based on an interview of Prof. Ron Johnston, University of Sydney, ASTEC, 2014

**Name of the Process:** Forward 2035, DSTO Foresight Study

**Year of the Process:** 2013-2014

**Financed by:** Australian Government, Dept. of Defence, Defence Science and Technology Organisation; DSTO- Science and Technology for Safeguarding Australia

**Operated by:** DSTO- Science and Technology for Safeguarding Australia

**Participation:** Workshops with approx. 40 experts each

**Thematic Focus:** complexity, change, opportunity, emerging science and technology, demands

**Objectives:** to describe the complexity of the whole field security; find (science and technology) answers to the fundamental changes Australia is facing (described in the Asian Century White Paper)

**Users:** Australian Government in general

**Experiences in implementation:** The foresight process was a direct reaction to the Australian Asian Century White Paper\(^6\) which stated: "The global centre of gravity is shifting to our region, the tyranny of distance is being replaced by the prospects of proximity. Australia is located in the right place at the right time".\(^7\) The paper was regarded as too much focused on traditional military

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\(^4\) [http://www.vinnova.se/upload/EPIStorePDF/vi_13_04.pdf](http://www.vinnova.se/upload/EPIStorePDF/vi_13_04.pdf)


\(^7\) From Commonwealth of Australia (2013): "Strong and Secure: A Strategy for Australia’s National Security", Department of the Prime Minister and Cabinet, October; cited in: Science and Technology for Safeguarding
thinking and classical technologies so that a group of active people from the DSTO who were familiar with foresight thinking started a foresight process with a broader view. They offer information and knowledge on wider and interdisciplinary connections of field on the background of leaving thematic boundaries and arguing with complexity.

Instead of just describing technologies, they bring to the forefront issues like Mastering Complexity, Trust in Technology, Smart Power or Innovation Enterprise. The trends they are describing are represented in the form of four principal stories focused on complexity, change, opportunity and demand.

The final report was just published and it is too early to assess the reception by the policy-makers but it was a very pro-active reaction towards a previous policy paper – and might have an impact on the next one as well as policy thinking in general in this field.

General Remark: In Australia, the different Foresight projects have small and more indirect impact. They – until now – did not lead directly to new programs. On the meso level of thematic fields they were perceived as fruitful starting points for further detailing topics or developing strategies (e.g. in the health sector). In the long-term view, they influence future(s) thinking, single issues and persons, but it is difficult to track these developments.

Recommendations derived from this experience:

- capacity building is important,
- to have patience as the results are sometimes rather seen in the process and long-term (e.g. after 20 years) and
- language changes (terminology) play an important role.

China

Description by Prof. Mu Rongping, Chinese Academy of Sciences, IPM, Beijing 2014


Year and Duration of the Process(es): (2013-2015)

Financed by: MOST (Ministry of Science and Technology, P.R.China)

Operated by: CASTED (Chinese Academy of Science and Technology for Development), guided by MOST (Ministry of Science and Technology of China)

Participation: The national technology foresight project (2013-2015) is composed of the General Research Group and the Field Research Group, the latter includes Information, Biology, New materials, Advanced manufacturing, Earth observation and navigation, Energy, Resources and environment, Population health, Agriculture, Marine, Transportation, Public security, Urbanization and city development. The main members of the General Research Group are well-known strategic scientists. The Field Research Group is composed of leading experts in their respective fields. A lot of S&T manager of MOST also participated in the project.

Thematic Focus: When finishing the analysis of development trends of S&T and major S&T demand, the national technology foresight project (2013-2015) focuses on the key technologies vital to China's economic and social development in the future of 5-10 years and makes recommendations for national key technology selection.

Objectives: The main components of the national technology foresight project (2013-2015) are the analysis of development trends of S&T, major S&T demand, a technology foresight survey and the selection of national key technology. These achievements of the project can provide effective support for “thirteen-five” S&T plan and important references of development trend of S&T for the public.

Users: The achievements of the national technology foresight project (2013-2015) will be submitted to research group of national “thirteen-five” S&T plan and provide effective support for the plan. It will also be submitted to other ministries and provide references for their practical
In addition, the achievement from the project will serve as the public products to the society and guide the allocation of social innovative resources.

**Experiences in implementation**: The achievements of national technology foresight in the years of 2003-2005 provided important references for the Chinese medium and long-term S&T development plan. Some results are used in the plan directly. The publication of the project has become an important base for the enterprises to formulate their development strategy of S&T. In the following years, CASTED kept on the research accumulation and gradually formed the technology foresight research route of **technology level evaluation-foresight-key technology selection-technology road mapping**. Technology level evaluation which is to evaluate a present position of technological capacity is one of the most basic studies for the national S&T Plan. Technology foresight activities provide important reference for the future S&T deployment and guide the social innovative resources allocation effectively. Technology road mapping provides a path to achieve the vision. The technology foresight research route is applied in the national technology foresight project (2013-2015). It will provide effective support for the S&T plan and promote the capacity building of national S&T governance.

**Japan**

**Description by Dr. Yokoo Yoshiko**, National Institute of Science and Technology Policy, MEXT, Tokyo, Japan

**Name of the Process(es)**: The 9th Science and Technology Foresight

**Year and Duration of the Process(es)**: 2 years (2008-2010)

**Financed by**: Cabinet Office

**Operated by**: National Institute of Science and Technology Policy (NISTEP), Ministry of Education, Culture, Sports, Science and Technology (MEXT)

**Participation**: Around 3,300 persons took part in the process, mainly in the Delphi survey. Most of them were experts in S&T fields, but experts in social science and citizens were also included to provide insights from societal perspectives. Details are as follows:

- Discussion on mission of S&T: 25 (four panels composed of experts in S&T fields and ones in social science)
- Delphi: 3,057 (twelve panels mainly composed of experts in S&T fields: 157; Respondents to the questionnaire: 2,900)
- Scenario: 65 (members of twelve working groups: 56; scenario discussion members by young ICT experts: 9)
- Workshop: 129 (participants in the workshops held in eight cities/towns, including local experts from academia, industry, and citizens)

**Thematic Focus**: The main theme is “Contribution of Science and Technology to Future Society” which leads to an overview of different topic fields. The process was carried out to explore scientific and technological solutions for four grand challenges: central player in the scientific and technological arena, sustainable growth through green innovation, successful model for affluent and vibrant aging society, and safe and secure life. It especially focused on “green innovation” and “life innovation”.

**Objectives**: The process was conducted to provide information useful for discussion of the Fourth Science and Technology Basic Plan. It intended to clarify policy measures to be taken in view of coping with future challenges.

**Users**: Expected users are policy makers, research planning division of companies, research administrators in universities, and other related persons. Results sometimes get media exposure, which leads to broad use.

**Experiences in implementation**: Results were provided to the discussion at a Meeting of the Minister of State for Science and Technology Policy with the CSTP (Council for Science and Technology) executive members just before general publication. The presentation meeting was also held for related persons at MEXT about the same time.
Results have been continually used since releasing the reports because they give medium- to long-term future perspectives until 2040. For example, they contributed to the discussion of “Japan Vision 2020” at MEXT in 2013. Study meetings within MEXT or other related parties use results of the process corresponding to their own interests from time to time.

Lessons:

- Different forms of implementation and use of results
- Direct access to policy-making via CSTP/ Prime Minister

**South Korea**

**Description by Dr. Byeongwon Park**, Korea Institute of S&T Evaluation and Planning, KISTEP, 2014

**Name of the Process(es):** 4th Korean Technology Foresight Program

**Year and Duration of the Process(es):** 2010-2011, 2 years, (Official report published in Feb. 2012)

**Financed by:** National Science and Technology Commission (NSTC)

*(NSTC was established in 2008 as a independent organization to coordinate STI activities. The ministry of Education and Ministry of S&T were merged to become Ministry of Education, Science and Technology. However, in 2013 under the new administration, NSTC was abolished. Instead a New Ministry called Ministry of Science, ICT and Planning was established and NSTC(National S&T Council) is re-installed to coordinate cross-ministrial STI activities. It is co-presided by Prime Minister and one Civilian)*

**Operated by:** Korea Institute of S&T Evaluation and Planning (KISTEP)

*(KISTEP is responsible to carry out a TF program since 2003, mandated by the S&T Basic Framework Law. However it is allowed that each ministry or R&D agency could run their own Foresight Programs)*

**Participation:** It was carried out based on expert panels.

<table>
<thead>
<tr>
<th>1) NSTC</th>
<th>2) Steering Committee</th>
<th>3) Secretary Organization</th>
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<tr>
<td>4) Technology Forecasting</td>
<td>5) Technology Assessment</td>
<td>6) Future Perspective</td>
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Panel | structure | Role & Responsibility
<table>
<thead>
<tr>
<th>1) NSTC</th>
<th>~ 15 people</th>
<th>Overall decision</th>
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<tr>
<td></td>
<td>(1/2 gov. official from ministry, 1/2 civilian)</td>
<td></td>
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<tr>
<td>2) Steering Committee</td>
<td>~ 20 people</td>
<td>Direction for running TF</td>
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<tr>
<td></td>
<td>Expert from industry, academia, GRI)</td>
<td></td>
</tr>
<tr>
<td>3) Secretary Organization</td>
<td>KISTEP NSTC Office</td>
<td>Assist and Operation</td>
</tr>
<tr>
<td>4) Technology Forecasting</td>
<td>~ 8 sub-committees - 8-12 people - mostly S&amp;T expert)</td>
<td>Identification of future technology for Delphi Survey</td>
</tr>
<tr>
<td>5) Technology Assessment</td>
<td>~ 8 sub-committees - 8-12 people - mostly S&amp;T expert</td>
<td>Assessment 1st TF (1994) and 2nd TF (1999)</td>
</tr>
<tr>
<td>6) Future Perspective</td>
<td>~ 3 sub-committees - ~ 21 people from Social Science, Humanity and S&amp;T</td>
<td>Anticipation of Future Korea</td>
</tr>
</tbody>
</table>

**Thematic Focus:**

[Technology]

- Material and Chemistry
- Life Science and Healthcare
- Information, Electronics and Communication
- Energy, Resource and extreme technology
- Machinery, Production, Aerospace
- Agriculture and Marine Technology
- Urban, Construction and Transportation
- Environment, Earth Science and Ocean
[Future Perspective]

- Globalization and Rise of China
- Demographic Change, Social Issues, Terror and Conflict
- Environmental and Energy Challenges, Climate Change, S&T

**Objectives:**

- Provide the vision and direction of emerging S&T area through the identification of new technology that may have high potentials for growth of national wealth and betterment of quality of human life
- Implemented into the national 5 year S&T Basic Plan

**Users:**

[direct user]

- Each R&D Ministries and their R&D agencies: Development new R&D program and its justification (for next 5 year)
- NTSC: guideline for budget allocation and coordination of R&D

[indirect user]

- Industries: reference material for long term S&T development direction
- Civil Society: Understanding the impact of new technology, future change

**Experiences in implementation:**

- Korean TF is well-matured and accepted as standard policy tool for R&D policy formation due to mandatory requirement to be implemented next 5-year S&T Basic Law
- It utilized many sophisticated methods to identify the development of future technologies in addition to the anticipation of future societal changes.
- It becomes a benchmarking exercise so that many ministries want to copy the process and reuse some of the results
- However there are still many issues to be improved in next TF exercise.
  - Participation: it still heavily depends on experts though hard attempts to enlarge the participation from civil societies.
  - Topics: Since the 3rd TF exercise, there are continuous tries to include societal issues in the early phase of the exercise, the main product is future technologies. It is due to the requirement by the Law that the results should be implemented into the S&T basic plan. Policy makers and even scientists and engineers are more accustomed to the S&T push policy. However, it seems that new direction for TF exercise is quite promising to embrace the all socio-technical future issues with wider participation from various social stakeholders
  - Implementation (into STI policy): it is still grey to assess the implementation. One of key concern is time horizon of TF exercise. The time horizon for the 4th program is set to 2035 that is quite a far future compared with a general policy horizon and the short-termism of decision makers. Secondly, S. Korea has a strong ministerial policy-making tradition and it is relatively difficult to link the results of TF with each ministry’s new R&D program. Thirdly, the Delphi survey based TF has limitations in itself. The level of a technology survey is relatively small (too detail) and it is difficult to further develop an R&D program (not project). Fourthly, each ministry has developed its own foresight program dedicated to the specific business area. So top-down, full but thin coverage of all S&T fields is not enough to be utilized right away.
  - Externality: for the last twenty years since 1993, Korean TF has been a landmarking exercise for STI policy making and embraced as one of the standard STI policy tools. The policy makers, scientists and engineers, and even civil society agree about the necessity of forward looking activity. Additionally, the participants who experienced the TF process have tried similar exercises in their own organization.
  - Future direction: (this is a personal opinion from Byeongwon Park from STEPI): In the next 5th TF (2016-2017), the new and innovative process and strong linkage to policy
are expected, such as the National TF will be focuses on more strategic areas, not
technology itself, and may be used as a guideline for STI future directions

- Multi methods will be tried. The traditional Delphi survey method cannot cover the all
  needs for new STI systems.
- There will be more participation from civil society and industries. In addition, there will
  be more collaboration/cross linkage from other forward looking activities in the
  economic and social policy area.
- Probably, there will international collaborations. There are already experiences to run
  international foresight exercises: Korea-Finland, Korea-Japan-China on specific area.
- It is expected to see more issue/sector–based foresight administrated by each
  ministries, R&D agency and Academia.

**Annotation on the Legal Basis:**

From KISTEP website (http://www.kistep.re.kr/en/c2/sub1.jsp, access 20/1/2015):

**Foresight and Future Strategy for Science & Technology**

- In order to establish the national science and technology strategies, we perform activities such
  as future trend analysis, technology foresight studies, technology level evaluation, technology
  impact assessment, and the development of the national standard S&T classification system
- Legal Basis: Articles 13, 14 and 27 of the Science and Technology Framework Law

**Science and Technology Policy Planning and Coordination**

- Overview: In order to lead the creative economy and to strengthen the competitiveness of
  national science and technology, we establish the national science and technology policies and
  plans in addition to planning, operating, and improving related systems.
- Legal Basis: Article 7 of Framework Act on Science and Technology and Article 5 of Special Law
  for supporting natural science and engineering etc.

**U.S.A.**

**Interview with Prof. Dr. Caroline Wagner**, John Glenn School of Public Affairs, Ohio State
University, USA, December 2014 by Dr. Kerstin Cuhls, Fraunhofer ISI

**Questions** were:

- What are activities in foresight with an impact on policy-making in the US?
- What is the role of the different actors?

In the U.S.A., there was early foresight activity on the national level that was coordinated by an
office dedicated to “emerging” or “critical technologies”, and later coordinated by RAND. The
“critical technologies” studies were regulated as an amendment of a law (for details see Wagner
and Popper 2003).

The Office of Technology Assessment (OTA) was also trying to advice on critical technologies
format. In this format, discussing the questions was the major benefit as a panel of expert was
involved in the different interviews.

When the OTA was closed in 2001 and the amendment of the law ran out, there was no national
initiative in foresight, anymore. Different agencies ran foresight activities on different levels, most
of them had internal activities.

The ministries went on with own future-oriented activities, but in most cases, roadmaps were
found. This kind of performing more systematic foresight is still mainly found in industry, mission
agencies and associations.

The World Futures Society is the largest representation of Futurists in the world and has many
members from the US.

Foresight on the national level was not systematized but there are a kind of Grand Challenges/
visions, which were rather broad. They are reported to the President each year so that this kind of
information is brought to the White House. The Office of Science and Technology (the former responsible unit for the critical technologies) supports it.

Other information about future issues are brought into the science and technology system via different channels. A large role has the NSTC, the National Science and Technology Council, representing different agencies of the country. The members of the council are providing direct input to policy-making and have “lists” of technologies to support. They work in a partly centralized, partly de-centralized way. But in the end, they did not really help the National Science Foundation (NSF) or other funding agencies to select their scientific priorities or for their funding.

The NSF has an interesting way of funding: Small Grant for Exploratory Research (SGER, sometimes called “SUGAR”) proposals are for small-scale, exploratory, high-risk research in the fields of science, engineering, and education normally supported by the NSF. Especially after the hurricane Katrina proposals were funded if they met the following criteria:

- preliminary work on untested and novel ideas;
- ventures into emerging and potentially transformative research ideas;
- application of new expertise or new approaches to "established" research topics;
- having a severe urgency with regard to availability of, or access to data, facilities or specialized equipment, including quick-response research on natural or anthropogenic disasters and similar unanticipated events; or
- efforts of similar character likely to catalyze rapid and innovative advances.

SGER awards cannot exceed $200,000 for a period of two years, however most are for smaller amounts and/or for shorter durations. They were supposed to bring in new ideas. Some projects are well organized, others are less.

There is also the National Science Board, but they have careful, scientific, rational approaches.

The role of the US Government Accountability Office (GAO) is rather unclear and not large because of the lack of capacity (they are only four persons), the (political) influence of the Senate, due to their location in the Congressional Office and because they do not perform systematic studies.

All in all, there is no accepted methodology set in foresight, all projects are rather "handcrafted". The critical technologies approaches were also not very strict in methodology.

Currently, an interesting dynamic can be seen: the US government feels that they are losing ground in S&T and that the European system is very strong. This is rather a frantic feeling of not being in the lead. It does not mean that there might be extra money. Universities in the US are more and more closely linked to industry, less "science", more application. Foundations are very specific. In the US, there is no continuity. The national concern is that in the (existing and upcoming) global network of science, "they“ are losing control – because there is no control, anymore. The open access movement and open innovation underline this development even more. Foresight and other research is rather conducted by individualists, not in a systematic way.

To sum up, Foresight in the U.S.A. exists but there are no systematic national activities, no generally accepted methods or methodological approaches, no “single national foresight” but a lot of different attempts that are more “handcrafted”.


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This study takes stock of recent and past Foresight activities in non-European countries with a focus on Southeast Asia. To demonstrate some existing Foresight processes in Europe, selected European foresight activities are added. The purpose of this study is that the European Commission can learn from national foresight activities of all kinds how they are performed and how they are linked to policy-making. The study identified ways of linking Foresight to policy-making and gives some examples of successful applications that offer some lessons to be learned in their specific cultural and political context. The study is selective but allows giving some recommendations for future work at the interface between Foresight and policy-making. A Position Paper is derived from the study.

Studies and reports