

# Experiences and Practices of Technology Foresight in the European Region

Attila Havas, Doris Schartinger & Matthias Weber

## Abstract

Foresight has evolved as a distinct prospective analytical tool: it considers alternative futures of various S&T fields or socio-economic systems by bringing together the representatives of various stakeholder groups, and thus assists the decision-making processes at different levels. In order to avoid the emerging of “hype – disappointment cycles”, which could be observed in the case of new, initially promising technologies, the potential contributions to decision-making processes by foresight should be clearly understood. The paper puts foresight into this broader context of policy (decision) –making processes: it describes the evolution of different policy rationales since the 1950s, develops a framework to classify the impacts of various types of prospective analyses, and reviews the evaluation results of several national foresight programmes by using this framework.

## Keywords

Foresight, innovation policy, impact assessment, evaluation, policy learning, policy co-ordination, distributed policy-making, Europe, Central and Eastern Europe, emerging economies

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## Biographical Notes

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# 1 Introduction

The evolution of foresight since its inception in Europe in the 1990s is a success story; it has acquired prominence as a process aiming to support forward-looking opinion formation in decision-making, both for public policies and business strategies. This is reflected, for instance, in the range of domains to which the initial national technology foresight approach has been transferred over the past few years: (i) multi-country; and (ii) regional levels, as well as (iii) sectoral perspectives; and (iv) various policy areas, beyond STI policies.

In spite of this apparent success, the perspectives for the future are far from clear. The notion of “hype – disappointment cycles”, which has been developed to describe the patterns of attention paid to emerging technologies, might be applicable to foresight, too: initial enthusiasm has given way to a significant deal of scepticism in several countries, and more recently to a more realistic assessment of the strengths and the weaknesses of various types of prospective analyses.

There are two main reasons for this: (i) embedding foresight in the decision-making processes is a far from trivial task; and (ii) the requirements from the new application domains where foresight is used, are not only challenging, but also different from science, technology and innovation policies.

In this paper, we will look specifically at one of the policy areas where foresight has become more prominent: innovation policy. The paper will proceed along three main steps. First, we position foresight in the context of political decision-making and implementation processes. Second, we analyse the links between foresight and innovation policy. Third, we summarise the insights into the actual and expected impact of foresight gained from several evaluation exercises, with a particular emphasis on policy impacts.

## 2 Policy Challenges: Why to Conduct Foresight

### 2.1 Policy rationale for running foresight programmes

A number of technological, economic, societal, political and environmental trends affect all countries and most areas of policy-making, thus a new *culture of future-oriented thinking* is needed. Foresight can assist policy processes in various ways. It stresses the possibility of different futures (or future states), as opposed to the assumption that there is an already given, pre-determined future, and hence highlights the opportunity of shaping our futures. Further, it can enhance flexibility in policy making and implementation, broaden perspectives, and encourage thinking outside the box (“think of the unthinkable”).

The increasing number of national foresight programmes suggests that foresight can be a useful policy tool in rather different national innovation systems. As a growing body of literature analyses this surge, the major factors explaining the diffusion of foresight can be summarised here in a telegraphic style:

- Globalisation, sweeping technological and organisational changes, as well as the ever-increasing importance of learning capabilities and application of knowledge have significantly altered the ‘rules of the game’. Thus, policy-makers have to take on new responsibilities (as well as dropping some previous ones), while firms must find new strategies to remain, or become, competitive in this new environment.
- Given the above factors our future cannot be predicted by any sophisticated model. Planning or forecasting of our future becomes more and more ridiculed in light of rapid and fundamental changes. History also teaches us valuable lessons about the (im)possibilities of planning and predicting the future. Therefore, flexibility, open minds for and awareness of possible futures are inevitable. Diversity is a key word: diversity in scope (in terms of possible futures, differing analyses etc), as well as diversity in solutions or policy options.
- Decision-makers face *complex* challenges: socio-economic and technological factors interact in defining issues of strategic importance, e.g.
  - education and life-long learning (new demands on education systems; new, mainly IT-based tools and methods for teaching and learning; the growing need for interaction and co-operation with businesses);
  - environmental issues;
  - quality of life (health, education, demographic changes, especially the growing share and special needs of elderly people, living and working environment, social conflicts, crime prevention, etc.);

- competitiveness (at national and EU-level for attracting talents and capital, at firm level maintaining and increasing market shares nationally and internationally, etc.);
- regional<sup>1</sup> disparities, especially in large countries.
- Most policy problems no longer have ‘self-evident’ solutions. Governments are forced to make use of ‘evidence-based policies’, policies based on knowledge/insight into what works and what does not. This does not mean that values are no longer of importance. Values are still very important, but have to be considered in the context of a given issue.
- Policy-makers have to learn to cope with growing complexity and uncertainty of policy issues themselves. Thus the precautionary principle is of a growing significance.
- New skills and behaviour are required (e.g. problem-solving, communication and co-operation skills in multidisciplinary, multicultural teams meeting more often only “virtually”, as well as creativity) if individuals or organisations are to prosper in this new setting. This, in turn, creates new demands on the education and training system (see above).
- Clusters, networks (business – academia, business – business, both at national, international levels) and other forms of co-operation have become a key factor in creating, diffusing and exploiting knowledge and new technologies, and therefore in satisfying social needs and achieving economic success.
- There is a widening gap between the speed of technological changes and the ability to formulate appropriate policies (which requires a sound understanding of the underlying causes and mechanisms at work.)
- Given the growing political and economic pressures, governments try hard to balance their budgets, while cutting taxes, and hence they need to reduce public spending relative to GDP. In the meantime accountability – why to spend taxpayers’ money, on what – has become even more important in democratic societies. Public R&D expenditures are also subject to these demands.
- Policy-makers also have to deal with intensifying social concerns about new technologies (mainly ethical and safety concerns in the case of biotech or nuclear technologies, and fears of unemployment and social exclusion caused by the rapid diffusion of information and communication technologies).
- Even the credibility of science is somewhat fading. Scientific research no longer stands for ‘true’ in itself. The ‘objectiveness’ of policies based on scientific research is questioned (by citizens, interest groups, etc.) as scientists themselves are known to have different opinions and come to different conclusions on the same issue.
- More generally, individualisation, as a major recent trend, has several repercussions. The ever more mature and independent citizens want to be catered to their needs; this calls for ‘mass customisation’ not only in manufacturing and services, but to some extent also in policy-making. They are also more and more informed about possibilities, possible negative effects, and will not hesitate to voice their preferences. On top of this the social bases for decision-making are quickly eroding. The ‘usual’, erstwhile social groupings to which people belonged (e.g. churches/ religions, socialists, entrepreneurs, workers) no longer provide relevant, sufficient guidance for all areas of decision-making. People can, and nowadays do, belong to a multitude of different interest groups; they are not bound by the traditional ‘pillars’. Thus, the role of the traditional intermediaries (political parties, unions etc) is becoming less dominant. More and more specific interest groups (new intermediaries, e.g. NGOs) have sprung up, and become increasingly important. This can be seen as a supplement to democracy; citizens are exercising ‘voice’ in new ways (not just once in 4-year election periods). Therefore decision-making is becoming ever more complex. Coalitions (not those of political parties, but of stakeholders) are not fixed, they tend shift issue by issue. All this calls for openness on possible futures, flexibility, and room for diversity as mentioned above.

Besides the above trends, there are other specific, policy-relevant methodological reasons to apply foresight. First, it can offer vital input for ‘quantum leaps’ in policy-making in various domains. Usually policies evolve in a piecemeal way, in incremental, small steps. From time to time, however, a more fundamental rethinking of current policies is needed. In other words, policy-makers occasionally need to ask if current policies can be continued: do they react to (early) signs of changes, block or accommodate future developments?

The parable of the boiling frog illustrates this point ‘vividly’: put a frog in a cooking pot with cold water, and start heating the water. The frog will not jump out, because it does not alerted by the slowly rising temperature. It will boil alive.

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<sup>1</sup> In this particular point, regional disparities are to be understood as intra-country ones.

Second, foresight can also help in picking up *weak signals*: weak but very important signals that a fundamental re-assessment and re-alignment of current policies are needed. In other words, foresight can serve as a crucial part of an *early warning* system, and it can be seen as an instrument for an adaptive, 'learning society'.

In sum, participative, transparent, forward-looking methods are needed when decision-makers are trying to find solutions for the above challenges. Foresight – as a systematic, participatory process, collecting future intelligence and building medium-to-long-term visions, aimed at influencing present-day decisions and mobilising joint actions – offers an essential tool for this endeavour. (EC DG Research, 2002) It helps in making choices in an ever more complex situation by discussing alternative options, bringing together different communities with their complementary knowledge and experience. In doing so, and discussing the various visions with a wide range of stakeholders, it also leads to a more transparent decision-making process, and hence provides a way to obtain public support. The process, in which stakeholders communicate and share ideas concentrating on longer-term issues, generate consensus, and co-operate with increased commitment in devising and realising a national strategy, has been deemed so crucial in several countries that it has become one of the explicit objectives of running a foresight programme. The foresight process can reduce uncertainty, too, because participants can align their endeavours once they arrive at shared visions. Many governments have already realised the importance of foresight activities, and thus this relatively new, and innovative, policy tool is spreading across continents.

## 2.2 *Relevance of Foresight for policy in CEE and other emerging economies*

The above general considerations apply in catching-up countries in the Central and Eastern European and NIS region, too. Quite a few pressures – especially the need to change attitudes and norms, develop new skills, facilitate co-operation, balance budgets – are even stronger than in the case of advanced countries. Moreover, most of these countries also have to cope with additional challenges: the need to find new markets; fragile international competitiveness; relatively poor quality of life; brain drain. These all point to the need to devise a sound, appropriate innovation policy, and even more importantly, to strengthen their respective systems of innovation. Foresight can be an effective tool to embark upon these interrelated issues, too, if used deliberately in this broader context.

Foresight can also contribute to tackle yet another challenge of emerging economies: most of them are struggling with 'burning' short-term issues – such as pressures on various public services, e.g. health care, education, pensions and thus severe budget deficit; imbalances in current accounts and foreign trade; unemployment; etc. – while faced with a compelling need for fundamental organisational and institutional changes. In other words, short- and long-term issues compete for various resources: capabilities (intellectual resources for problem-solving); attention of politicians and policy-makers who decide on the allocation of financial funds; and attention of opinion-leaders who can set the agenda (and thus influence discussions and decisions on the allocation of funds). These intellectual and financial resources are always limited, thus choices have to be made. A thorough, well-designed foresight process can help identify priorities, also in terms of striking a balance between short- and long-term issues.

Further, foresight can offer additional "process benefits" in the CEE/NIS region. By debating the various strengths, weaknesses, threats and opportunities of a country posed by the catching-up process, and the role of universities and research institutes in replying to those challenges, the process itself is likely to contribute to realign the S&T system (including the higher education sector) to the new situation. An intense, high-profile discussion – in other words, a wide consultation process involving the major stakeholders – can also be used as a means to raise the profile of S&T and innovation issues in politics and formulating economic policies. (Georghoiu, 2002)

To conclude, foresight can be a useful tool in the CEE region and other emerging economies, too; in spite the fact that these countries can only exceptionally push the frontiers of S&T progress. A number of factors seem to contradict this conclusion at the first glance. Foresight is costly in terms of time and money. Further, advanced countries regularly conduct foresight programmes, and their reports, Delphi-survey results, etc. are readily available. Yet, only a national programme can position a country in the global context and stir up dialogues on how to react to major S&T, business, societal and environmental trends. Similarly, strengths and weaknesses of a given country would not be discussed by other programmes, let alone broad socio-economic issues. Process benefits cannot be achieved without a national programme, either. Without these, a country would not be able to improve the quality of life of her population and enhance her international competitiveness.

There are even stronger needs for strategic thinking in CEE countries and other emerging economies than in the advanced countries, given their specific challenges, in particular their transition processes and major changes in their external environment. Yet, long-term thinking is discredited across the region. Policy-makers do not rely on modern decision-preparatory tools to a sufficient extent, and quite often do not realise the close interconnections between RTDI processes and socio-economic development. Thus, in many cases, they are only willing to spend on R&D when “we can afford” – although it should be the other way around: “we spend on promoting RTDI processes, because we want to foster wealth creation”. Science, technology and innovation policies are isolated from each other – if not “fighting” for the same, limited set of resources –, and major economic policies are not co-ordinated with STI policies.

Foresight may change these attitudes, but exactly because of these factors, foresight programmes are only scattered in the region. One cannot observe strong commitment for profound foresight programmes, that is, serious consideration and determined implementation of policy recommendations, accepting/ introducing a new decision-making culture, along with a new way of thinking, with more emphasis on communication, co-operation, consensus among the major stakeholders, and joint commitments to take action.

However, foresight should not be conducted for its own sake – just because it is becoming “fashionable” throughout the world, and currently being promoted by international organisations. On the contrary, there should be a strong link between foresight, decision preparation and policy-making: foresight should be used as a policy tool to address major socio-economic and political challenges. It is not a panacea, however; it cannot solve all the problems listed above, and cannot solve any of them just on its own. Obviously, other methods and tools are also required, as well as an assiduous implementation of the strategies devised either at national, regional, sector or firm level.

### 3 From Technology Foresight to integrated policy strategies

#### 3.1 Positioning foresight in the policy process: towards policy integration

In the 1960s, government policies in relation to research and technology were predominantly inspired by an approach that today is often labelled as “picking winners”: promising technologies, sectors and large players were selected as being of particular public or strategic interest and were thus doted with significant amounts of financial and other types of support. With the recognition of the limitations of government’s ability to actively plan and shape future developments in an efficient and fully informed manner, the late 1970s saw the emergence of new paradigm in research, technology and – then also – innovation policies, which was characterised by a focus on shaping framework conditions that are conducive to innovation. This ‘hands off’ approach was subsequently evolving into what is nowadays called the systems approach to research and innovation, which not only deals with framework conditions but also with the institutional and structural settings for R&D and innovation (RTDI). In line with these concepts, the 1990s were also characterised by a great reluctance of government policy to prioritise and select technologies and research themes in a top-down manner. In recent years, and driven by fiercer competition at global level for, especially, private investment in RTDI processes, we can observe a shift in policy-making practices from shaping framework conditions and structural settings towards strategic decision-making. Strategic means here that the thematic portfolio of a country and region and the medium- to long-term perspectives are given a greater weight in science, technology and innovation (STI) policies again. However, the growing complexity of innovation processes is also recognised, by stressing the bottom-up component of networking and clustering as important instruments for enhancing the innovative performance in emerging areas of specialisation. (OECD, 2002)

Similar to this shift in approaches to innovation processes and STI policies, there has been a shift in the conceptual understanding of policy processes. Taking into account insights from strategic planning and complex social systems thinking, recent developments in policy-making processes go beyond earlier cycle models and stress interactivity, learning, and the decentralised and networked character of political decision-making and implementation. Earlier technocratic and **linear process models** of policy making in terms of ‘formulation – implementation – evaluation’ phases were replaced by **cycle models**, where evaluations are supposed to feed back into the policy formation and implementation phases. Already in these cycle models, **policy learning** is seen as an essential ingredient of political governance. Recognising the fact that in view of the complexity and the ever changing character of the object of policy – which strongly applies in the case of innovation policy –, there is neither a clear-cut recipe for, nor an overarching theory, of policy. From a different angle, we should acknowledge a fervent need for continuous adaptation and re-adjustment of policies and related instruments.

More recently, it has been recognised that the effectiveness of policy depends also on the involvement of a broader range of actors than those formally in charge of policy decisions. The concept of **distributed policy-making** and **intelligence** (Kuhlmann *et al.*, 2001) draws our attention to various policy practices relying extensively on the knowledge, experience and competence of the different stakeholders concerned. From this network perspective, policy making is not just about government, but about the joint impact of public and private decision-making having an impact on society's course of change and the networked interactions that precede formal decision-making. For government policy to be effective, this implies the **participation of stakeholders**. Further, the role of government is shifting from being a central steering entity to that of a moderator of collective decision-making processes, that is, the principles of modern democracy have an effect in these fields, too.

With such an open and distributed model of policy-making in mind, it is now increasingly recognised that an opening of political processes is necessary to ensure the robustness and the effectiveness of its outcomes. This is also reflected in the EC's White Paper on Governance (EC, 2001), which stresses **five principles of good governance**: participation, accountability, openness, effectiveness, coherence.

The complexity and the interdependencies involved in policy-making are also recognised in the need for **policy co-ordination**, if not integration, in four different respects:

- horizontal policy co-ordination, i.e. between different policy areas;
- vertical policy co-ordination, i.e. between different administrative layers;
- multi-level policy co-ordination, i.e. between different levels of governance (European, national, regional);
- temporal policy co-ordination, i.e. between different phases of policy making processes. (OECD, 2005)

In this context, foresight assists increasingly interdependent and partly autonomous decision-making processes in a systematic manner. Foresight looks well beyond current day-to-day decision-making concerns. It uses a participatory approach to generate insights on future challenges, directions of change, and thus devises alternative visions with the aim of informing decision-making processes, either in general terms of open debates or more specifically in support of specific issues that are up for decisions.

The aforementioned shift in conceiving of policy-making processes is reflected in the evolving practices of foresight. First of all, it has emerged as a distinct approach as opposed to forecasting exercises on science and technology. Historically this trend is linked to the adoption of the term 'technology foresight' as distinct from 'technology forecasting' and the like.<sup>1</sup> The underlying difference is that foresight is a participatory activity, involving representatives of different stakeholder groups, while forecasting activities are solely based on S&T expert opinion.<sup>2</sup>

As a second important trend, several foresight programmes have incorporated market and business aspects, while yet another group of them considered societal issues. This broadening of the scope of forward-looking exercises can be interpreted as a reflection of the abandoning of simplistic models of technological change, and the adoption of a systemic understanding of innovation processes, including the co-evolution of social, economic, and technological changes.

Thirdly, we can see a strong emphasis on, and belief in, the contribution of foresight activities to shaping rather than predicting and controlling the future. The Delphi surveys in the 1970s and 1980s were strongly influenced by the linear idea that the consensus achieved given the Delphi exercise could serve as a forecast, and thus as a foundation for taking preparatory actions to exploit emerging technologies. A similarly linear perspective, but from a different angle, holds for the critical technology studies conducted in the US, in France and the Netherlands. They also relied largely on a predictive approach and combined it with the idea of being able to secure through national policy a leading edge in selected technologies. (Andersen *et al.*, 2007) Subsequently, new forms of Delphi have been developed that do not strive to achieve consensus on future forecasts, but rather to map diversity of opinion. (Best *et al.*, 1986) In the meantime, countries that until the 1990s were relying on Delphi surveys to support their research and technology policies have recurred to complementing their tool box by other methods to promote more intense participation (e.g. direct communications among the participants); the cases in point are, for instance, the German Futur process or the French FutuRIS project.

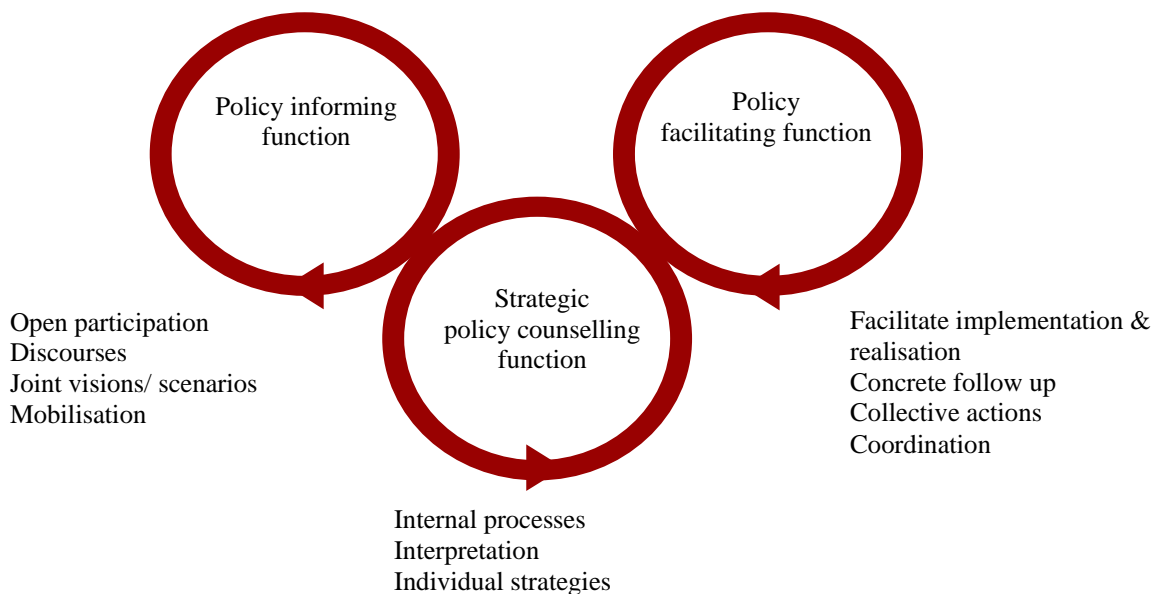
Foresight processes bring together not only experts, but also decision-makers from research, industry, policy-making and society, and thus a shared understanding of current problems, goals and development options can be expected to emerge among those actors that have an important role to play in shaping the future. This converging understanding of the issues at play is likely to contribute to improving implicitly the coherence of the distributed

decisions of these actors, in line with the shared mental framework developed. In other words, the future is being shaped by aligning expectations and thus ‘creating’ a self-fulfilling prophecy. These so-called process outputs are often regarded as more important than the actual substantive (or tangible) outputs like reports and websites.<sup>3</sup>

Finally, and most recently, we can observe an increasing interest in foresight activities that aim at **supporting strategy formation both at collective level and at the level of individual organisations**, e.g. “Adaptive Foresight” (Eriksson and Weber, 2007), or “Sustainability Foresight” (Truffer *et al.*, 2007). This interest is fuelled by the recognition that there is a translation problem apparent in foresight approaches that predominantly rely on broad participatory processes, namely the translation of shared collective problem-perceptions, expectations and visions into concrete decisions of individual actors and organisations. From this perspective, Foresight can be interpreted as an integral element of networked and distributed political decision-making by providing three crucial functions (da Costa *et al.*, 2007; Eriksson and Weber, 2007; Weber, 2006), which – in line with the network-type distributed model of policy-making processes – are provided simultaneously rather than in distinct phases:

- First, *policy informing* by generating consolidated findings concerning the dynamics of change, future challenges and options and transmitting it to policy-makers as an input into policy conceptualisation and design. This function is an important incentive for policy-makers to initiate a foresight programme in the first place.
- Secondly, *policy strategic counselling* by merging the insights generated in the context of policy informing foresight activities with perspectives on the strategic positioning and options of individual actors, to support their internal decision-making processes.
- Thirdly, *policy facilitating* by building a common awareness of current dynamics and future developments as well as new networks and visions among stakeholders, thus facilitating the implementation of policy strategies.

**Figure 1: Adaptive Foresight**



Source: adapted from Eriksson and Weber (2007)

Against this background, it is now possible to systematize the potential policy impacts of foresight, by drawing first of all on the three main functions of foresight in relation to policy-making processes, secondly on the range of impacts that have been assigned to foresight in the corresponding literature and thirdly on the time lag at which an impact occurs.<sup>4</sup> (Table 1)

**Table 1: A Framework to Classify Impacts of Foresight Activities**

Function	Time lag	Targeted and/or unintended impact
Informing	Immediate	<ul style="list-style-type: none"> <li>• Increased recognition of a topic area</li> <li>• Awareness of science, technology and innovation among players, creating debate</li> <li>• Awareness of systemic character</li> <li>• Training of participants in foresight matters</li> <li>• New combinations of experts and stakeholders, shared understanding (knowledge network)</li> </ul>
	Intermediate	<ul style="list-style-type: none"> <li>• Articulation of joint visions of the future, establishing longer-term perspectives</li> </ul>
	Ultimate	<ul style="list-style-type: none"> <li>• Integrate able new actors in the community</li> </ul>
Counselling	Immediate	<ul style="list-style-type: none"> <li>• Make hidden agendas and objectives explicit</li> </ul>
	Intermediate	<ul style="list-style-type: none"> <li>• Devising recommendations and identifying options for action</li> <li>• Activate and support fast policy learning and policy unlearning processes</li> <li>• Identify hidden obstacles to the introduction of more informed, transparent, open participatory processes to governance</li> </ul>
	Ultimate	<ul style="list-style-type: none"> <li>• Influence on (research/ policy) agendas of actors, both public and private (as revealed, for instance, in policy strategies and programmes)</li> <li>• Incorporate forward-looking elements in organisations' internal procedures</li> </ul>
Facilitating	Immediate	<ul style="list-style-type: none"> <li>• Effective actions taken</li> </ul>
	Intermediate	<ul style="list-style-type: none"> <li>• Formation of action networks</li> <li>• Creation of follow-up activities</li> </ul>
	Ultimate	<ul style="list-style-type: none"> <li>• Adoption of foresight contents in the research and teaching agenda of organisations; Foresight spin-off activities in various disciplines</li> <li>• Improved coherence of policies</li> <li>• Cultural changes towards longer-term, holistic, and systemic thinking</li> </ul>

Source: ARC sys, building on Cassingena Harper and Georghiou (2005), PREST (2006) and ForSociety (2007)

### 3.2 Different application areas

The various benefits of foresight in the policy-making processes can be enjoyed at the level of national economies, as well as at multi-country, or regional levels, or in industrial sectors. Moreover, policy-oriented foresight exercises have been addressing a wide range of fields. Thus, a rough categorisation of foresight exercises can be made in terms of its focus on:

- a certain geographical territory (i.e. local/regional, national, transnational, international)
- a certain socio-economic domain (a specific industrial sector, SMEs, clusters, etc.)
- a certain policy field (transport policy, innovation policy, etc.)
- a certain topic (women entrepreneurship, crime prevention, etc.)

In all these respects, the recent years have witnessed a broadening coverage of foresight programmes. The initial focus on predominantly national foresight exercises has been complemented especially by regional foresight (Gavigan et al. 2001), but also by a growing interest in European Union level and/or multi-country foresight exercises, where appropriate. The three latter 'thematic' categories have received fast growing attention, often in combination with one of the geographic levels. While initially, *technology* foresight was the dominant thematic focus of foresight initiatives, we have recently seen the emergence of topics that have hardly any link with technology, covering subjects such as poverty, social security systems, cultural heritage, etc. Not the least the regional wave of foresight has contributed to substituting the technology focus by the much broader concepts such as innovation and regional development.

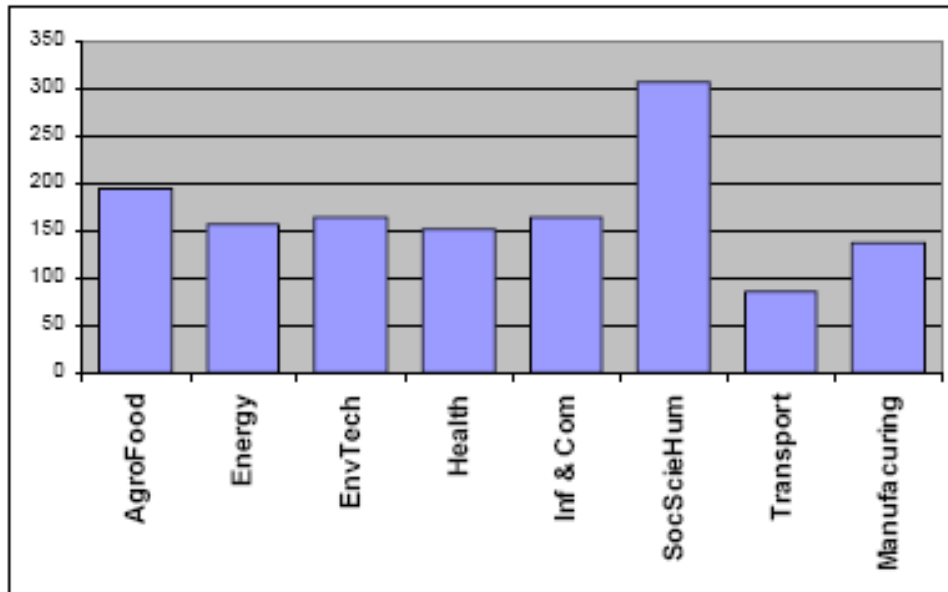
These arguments are supported by the findings of the European Foresight Monitoring Network (EFMN), which has conducted a systematic scanning and analysis of foresight exercises worldwide (though with a strong emphasis being put on the European Union). It shows that out of about 800 exercises analysed (as of September 2006), a fairly even coverage of the eight thematic areas can be observed, with exercises focusing on social science and humanities perspectives standing out a particularly important.<sup>5</sup> (Figure 2a)

Over time, there has been quite some fluctuation in terms of the relative importance of these thematic areas (Figure 2b), with socio-economic issues (in the database, and hence in the figure labelled as social sciences and humanities), ICT and energy growing significantly in importance over the past three to five years.

Environmental, energy and transport-related themes turned out to be the most important concerns cutting across the entire set of EFMN exercises (i.e. they were frequently mentioned in the EFMN exercises with a different focus), whereas projects on social sciences and humanities tend to be conducted rather as stand-alone activities with little reference to other areas. (Keenan et al. 2006, p.9; Figure 3)

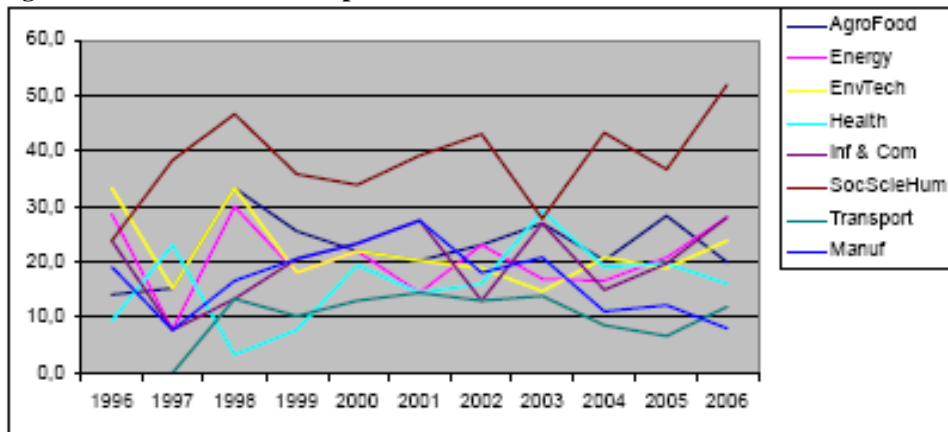
This quantitative evidence on the broadening of the thematic orientation of foresight work is further reinforced by looking at some of the specific themes that were addressed in the most recent generations of national foresight programmes, with subjects such as crime prevention (UK Mark 3), flooding (UK Mark 3), sustainable infrastructures (German socio-ecological research programme).

**Figure 2a: Importance of different thematic areas**



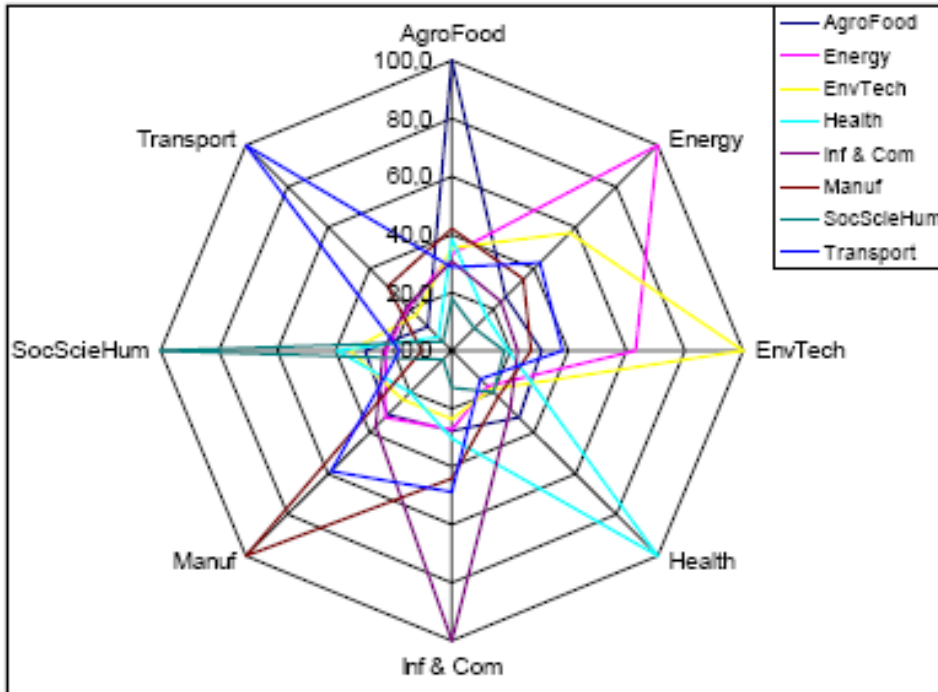
Source: Keenan et al. (2006)

**Figure 2b: Evolution of the importance of different thematic areas 1996-2006**



Source: Keenan et al. (2006)

**Figure 3: Consideration of main thematic areas in foresight exercises**



Source: Keenan et al. (2006)

While this first statistical analysis of recent developments in foresight/ prospective activities reflects the changes in importance that is assigned to different thematic areas and issues, it does not say much about the actual results that have been generated. In fact, a comprehensive and thorough analysis of the content of foresight exercises has not been conducted so far, not even for foresight in Europe. Cross-cutting analyses of foresight activities in Europe have focused on specific themes and areas.<sup>6</sup>

Foresights reports and policy strategy documents from seven EU countries have been analysed by Mahroum *et al.* (2004). The study identifies both major emerging socio-economic challenges and the potential contributions of main current and expected future developments in major fields of scientific and socio-technical research to tackling these challenges. Six main challenges were identified:

- **Pervasive globalisation:** Globalisation is widely regarded as an unavoidable trend that is creating major social and structural challenges for societies. The world's economies are bound together by trade, investments, financial flows and the growing mobility of highly trained people. Globalisation does not only make collaboration and openness between countries imperative, but also within societies. The rapid expansion of globalisation is literally transforming the European region into a borderless area with massive opportunities and enormous challenges.
- **Transition to a knowledge-intensive economy and society:** All countries are preparing for the knowledge-intensive society, as knowledge has become the most important competitive factor. The emergence of the knowledge-intensive (learning) society is identified as a main challenge in the vast majority of foresight reports analysed. In fact, the Finnish foresight report is even entitled *The Future is in Knowledge and Competence*.
- **Growing regional disparities and social marginalisation:** In a globalising and urbanising world, in which cities compete with each other to attract inward investment, local politicians are seeking to create high quality, healthy, attractive living environments for their own citizens, and to attract businesses from elsewhere. Businesses with high value-added and complex, knowledge-intensive activities are located in regions with good development conditions including strong knowledge infrastructure, a good business climate, availability of skilled labour, and a good living environment. All industrial countries are competing to create dynamic regions that provide these or similar conditions. However, this competition creates not only winners, but also losers, and growing disparities can be observed at the level of regions as well as at the level of individuals.
- **Transformation of health care:** The various foresight/ prospective reports indicate a clear need for a substantial overhaul of the health care systems, as Europe (and the world) embarks on a new dawn of preventive and pervasive health care services and delivery. Those will be primarily driven by a number

of forces, technological advances, aging, and changing lifestyles. Europe will be further challenged to harness its research capabilities to increase its ability to deal with, and prevent, health crises. The challenge is thus for European health care systems to move from curative to preventive health care systems. Preventive health care systems will require focusing on new ways of life (diet, drinking and smoking habits, sports, etc.), delivering health services, the development of new pharmaceuticals, diagnostics and treatments and also the development of healthy and functional foods and materials.

- **Management of environmental resources and energy supply:** The environment, high quality of life, and stable and efficient energy sources will increasingly become 'values' that people are interested in taking care of and that they are willing to pay for. The values are visible in investment patterns, consumer behaviour and legislative changes.
- **Consolidation of the information society:** The development enabled by digital solutions and the Internet will continue to have a crucial impact on the development of all industries and social sectors as well as on the lives and practices of individuals according to all reports surveyed. The digital revolution, with its new communications and information technology, has changed society and our way of living and it will continue to do so. The digital dimension is everywhere. These new applications will continue to help improve productivity in the traditional sectors of industry. They will also continue to change the workplace and the ways we work, providing us with greater independence in terms of time and space.

While these six challenges reflect the most important future concerns many European countries share, the reports analysed also underline the crucial importance of five existing and emerging areas of science and technology development for addressing these six challenges.

- **Complex systems management** is a critical scientific field. In almost all the challenges mentioned above, issues of a complex (as opposed to a merely complicated) nature are at play. In fact, the transformation of large-scale socio-technical systems can only be handled on the basis of a consolidated understanding of how mechanisms of complexity work.
- **Information and Communication Technologies** have obviously a key role to play when dealing with the problems of globalisation, with the realisation of the knowledge-intensive society, for reducing regional and social disparities, for environmental management and for health care. It is this pervasive character of ICT which makes it so critical.
- **Nanotechnology** is equally a pervasive technology, though not yet to the same extent as ICT. As an enabling technology, it also has an impact on the advancement of ICT and other ground-laying technology areas, which then find their application in health products and services, or various types of advanced products in a knowledge-based society/economy. Furthermore, due to its – contested – impacts on resource consumption, nanotechnology will have a direct impact on environmental resources, whether this impact will be positive or negative.
- **Biotechnology and genetic technology** are repeatedly mentioned as S&T areas of strategic importance. However, as their importance grows, they raise a number of important risks and contentious issues with respect to social disparities (e.g. access to advanced genetic cures), globalisation (investment in genetic technology with lax regulation) and knowledge-intensive economy /society (who benefits economically from genetic technology), let alone environmental resources (e.g. impact of genetically modified organisms and food).
- **Energy systems** have a rather clear prime challenge to address, i.e. environment and energy, but it is also of importance of globalisation (global energy supplies of oil, hydrogen, electricity), knowledge-based economy (economic impacts of cheap energy, external costs) and regional disparities (the energy rich vs. the energy poor, adapted technology to poor countries).

While this may be a sketchy representation of what is regarded in Europe as major challenges and S&T developments of the future, it is a first approximation. Obviously, the level of attention paid to these issues differs by country and depends on their specific socio-economic situation and cultural context.

## 4 Innovation policy and foresight

Similar to foresight, innovation is a horizontal, cross-cutting policy matter that affects many other policy areas, most notably energy, environment, transport, regional development, industrial change, health, education, and others ("horizontalisation"). These policy areas, in turn, can have quite important impacts on innovation processes and innovation performance, too. This implies that the requirements of these policy areas need to be taken into account in innovation policy and vice-versa. The growing inter-dependence of policy areas is one of

the motivations for stressing the need for better policy co-ordination with respect to innovation-related issues, and it has been one of the drivers behind the emphasis put on systemic innovation policy instruments in order to complement classical policy instruments such as direct research subsidies and public procurement. Systemic instruments are meant to enhance the capability of innovation systems for self-organisation and therefore address innovation policy at a system level.

These insights also contributed to the emergence over the past two decades of a more ‘humble’ perception of what policy-making can actually do and deliver with respect to innovation: (i) policy-makers cannot be seen as perfectly informed social planners, but at best as mediators and initiators of collectively negotiated decisions, and (ii) the formation of policy strategies must be seen as a continuous, interactive learning process.

From this perspective, *foresight* on innovation policy issues can be interpreted as a systemic co-ordination mechanism that not only mediates between policy actors and different stakeholder communities, but also between different policy areas (and their respective stakeholders) affecting innovation. In other words, foresight activities contribute to an infrastructure of distributed intelligence that is enabling the whole system to better address future challenges, and especially also link RTDI processes more closely to socio-economic needs by offering a forum for exchange between RTDI demand and RTDI supply perspectives. It is also reckoned that foresight actors develop a stronger inclination towards long-term strategic thinking and better access to relevant knowledge for developing their internal strategic planning. As a consequence, combining foresight practices with the establishment of other intelligence competences helps ensure the tight embedding of forward-thinking and policy learning.

These observations may serve to underpin the potential for synergies between innovation policy and foresight, but the actual effectiveness of foresight depends to a significant extent on its neat embedding in the innovation system and innovation policy context (‘contextualisation’). Subsequently, four important dimensions of this contextualisation shall be briefly discussed: governance culture, policy attention, socio-economic dynamics, and resource availability.

#### *Governance culture*

In countries that already have a set of elaborated innovation policies in place, these tend to be underpinned by a whole set of strategic intelligence instruments, ranging from innovation research and monitoring to impact assessments and evaluations. Within this portfolio, foresight often acquires a special role to inform debates, support strategy formation and facilitate the implementation of policies, but its influence on innovation policy depends on the role of the other instruments of innovation policy intelligence and learning. This kind of situation is characteristic of most Western European countries, where more or less differentiated governance mechanisms have been established to develop, monitor and re-orient government policies. In countries, where the innovation policy culture is less developed, such as in most transition economies, in developing and/or industrialising countries, foresight as a participatory approach can be much more prominent (‘visible’) in contributing to the co-ordination of policies and actors, not the least due to the absence of other intelligence approaches. In these countries, it seems to have the potential to structure catching-up processes in assembling new actors, integrate them into a consensus-oriented dialogue and thereby effectively support policy-learning and unlearning processes. Moreover, it provides the ground for setting up and exploiting the potential of other intelligence approaches by contributing to the shaping of an innovation and strategy culture. (The obvious examples are: CEE countries, Malta, and a number of developing countries.)

#### *Policy attention*

Still, the governance culture alone does not explain major differences in the effectiveness of foresight. In countries with a highly developed innovation policy culture, the importance of foresight as compared to other instruments depends very much on its positioning and the support enjoyed by high-ranking policy-makers. The British Mark I Foresight experience and its impact on agendas was not the least due to the high-level of policy attention it received, and to the close link to the responsible Minister’s office. In Sweden, the existence of a well developed range of other policy support mechanisms made foresight one instrument among others, and without gaining priority, it left much less room for impact. The on-going innovation policy foresight by the City of Vienna is closely tied to a process of re-positioning its STI policy, even if this close link may not have been intended right from the outset. However, one should also note the risks involved in a close link with, and attention of, policy-makers. Policy attention is often closely tied to issues that are high on the policy agendas, a situation that may give rise to an instrumental use of foresight results for political purposes rather than to an open-minded discourse about challenges and options for the future. The framing of a foresight exercise, e.g. in

terms of time horizon, objectives and ownership is crucial to ensure the right balance between attention and openness.

### *Socio-economic dynamics*

The timing of a foresight exercise is also very important for the contribution it can have to innovation policy. In countries that are facing major structural changes and expecting new developments to emerge in the coming years, the need for orientation and forward-looking information is much more pressing than in countries that are in a comparatively stable economic and social development phase. The transition economies in Central and Eastern Europe are examples in case (Havas 2003b), as well as many industrialising countries. However, also in the so-called advanced countries, characterised by apparently stable socio-economic structures, foresight can be highly relevant to discuss alternative futures. In the light of strong pressures stemming from globalisation and major social and techno-economic forces, quite fundamental and structural changes are required (e.g. in terms of business practices, economic structures and incentive mechanisms, skills development, attitudes, etc.), but are difficult to introduce due to strong path-dependencies inherent in the dominant socio-technical regimes.

### *Resource availability*

Closely related to the dimension of socio-economic dynamics, the availability of resources and finance can reinforce the interest in and the impact of foresight. Economic standstill or even recession tends to lead to resistance to change and makes it very difficult to allocate resources to new future-oriented activities. Yet, even under such unfavourable circumstances, shared visions can reduce uncertainty, facilitate priority-setting or at least the acceptance of the need for priority-setting, and thus lead to a more effective use and exploitation of scarce public money.

The horizontal nature of both innovation (policy) and foresight, and the embedding of foresight in its wider socio-economic and political are key aspects to be taken into account when discussing the impact of foresight, and its likely future(s).

## **5 The impact of foresight on policy**

### *5.1 Assessing the impact of foresight in the context of innovation policy*

The assessment of impacts of foresight must rely on a consolidated understanding of the policy processes it is embedded in, taking into consideration the three functions outlined above. The policy facilitating function has been highly stressed among foresight experts. However, the first methodological attempts to grasp not only the direct but also the indirect impacts of foresight exercises on the shape and course of government policies have been made only relatively recently. The empirical basis on which to draw is thus rather scarce. The analysis can only be based on the evaluation of four recent foresight exercises, the second rounds of the UK and Swedish foresight exercises, the eFORESEE project in Malta, and the experience with the Hungarian foresight exercise (TEP), with a fifth evaluation, i.e. the one of the German Futur process, not being publicly available.<sup>7</sup>

**Table 2: International Foresight Activities and their Evaluations**

Country	Dates of Foresight Process	Date of Evaluation Report/ Analysis	Years in Between	Public R&D Expenditures (2003, % of GDP)
Hungary	1997-2001	2004	3	0,62
Malta	2002-04	2005	1	0,19
Sweden	2002-04	2005	1	1,02
UK	2002-now	2006	0	0,68

Source: ARC sys, public R&D expenditures from the European Innovation Scoreboard 2005<sup>8</sup>

As regards the various functions of foresight, little is known so far in terms of impact assessment. While the informing function is generally acknowledged (though little hard evidence provided), the policy counselling and policy facilitating functions are still comparatively novel, and have thus not yet been subject to deeper investigations.

In this chapter, the various evaluation reports are analysed in terms of the impacts the foresight programmes had with respect to the three main functions of foresight according to the process model and the impact assessment framework outlined in Section 3: policy informing, policy counselling, and policy facilitating. Some key issues

resulting from this analysis of assessment results are discussed thereafter, aiming at highlighting contextual factors that strongly influence the likelihood of having an impact on policy (or not).

#### *Assessment of the Policy Informing Function*

Results of the foresight process constitute a ‘reservoir of knowledge’, which is available for policy-makers over the following years. They unevenly find their way as active inputs in the political discourse, either through personal networks or simply because there is a conclusive text available ‘off the shelf’ when policies are being drafted. (Georghiou *et al.*, 2004. p. 5)

With respect to the policy informing function, the quality of the reports produced during the foresight exercise is crucial. To simply make a report of the unstructured musings of a panel is seen as very negative and significantly undermines the effects such reports can have in decision-making processes. This is especially true, if the choice of the panel members, which consequently strongly determines the outcomes of the entire foresight programme, is neither transparent nor systematic. The information provided in the reports must not be perceived as party-political or partial either, as this clearly impairs the confidence in their quality. Instead, the trust in the quality of the reports (and thus their legitimacy as foundation for policy decision) increases if i) high-level independent experts are involved and carry the exercise (e.g. in the UK); and ii) the exercise is highly inclusive in terms of participation, which means that the knowledge of a large number of interested and informed people is tapped (e.g. Malta). In order to achieve this, foresight may need to be done in parallel at different levels, with different customers. (Arnold *et al.*, 2005, p. 33)

#### *Assessment of the Policy Advisory/ Strategic Counselling Function*

There are clear difficulties in assessing the policy advisory function, the most obvious of which is the time lag between the foresight exercise and the emergence of results in political decisions. The impacts of foresight activities on policy-making are likely to occur and become visible only some time after the foresight process for several reasons. First, it often takes time for the ‘reservoirs of knowledge’ to be found and absorbed, so they tend to shape decisions only after some time – although there are exceptions from this general tendency, see e.g. the Irish case. Secondly, the negotiation and bargaining processes associated with policy formation, interpretation, and implementation also take their time and lead to a decelerated perception of actual foresight impacts. (PREST 2006, p. 17) This holds for both the products and the process benefits of foresight.

The situation is slightly different in those cases where foresight elements are closely linked to processes of policy formation, like for instance in the context of the Dutch Transition Management experiences. (Kemp and Rotmans, 2005; the recent review of the Austrian technology and innovation policy strategy, BMVIT, 2006) In these cases, the impact on policy formation is quite immediate, but they require a balance between open participatory and closed internal phases of opinion formation.

#### *Assessment of the Policy Facilitating Function*

There is very little known about the continuing contact of major stakeholders after the end of a foresight exercise. In Sweden, at the individual level nearly everyone found that participating in TF2 was an immensely enjoyable and learning experienced and [...] that their personal networks were greatly expanded, in a number of cases they also argued that this would boost their careers. (Arnold *et al.*, 2005, p. 30) The adherence of distinct networks on the whole, formed during the foresight process, seems to depend to a great extent on financial support after the end of foresight exercise; see, e.g. the UK experience.

## *5.2 Special features of the evaluation of recent foresight exercises*

### *5.2.1 The Second Foresight Round in the UK*

The evaluation report of the UK Foresight round launched in 2002 found as immediate effects the increased recognition / profile for the topic area, and new combinations of experts and stakeholders brought together. Both may be attributed to the policy informing function. (PREST, 2006, p. 17ff)

Intermediate effects include i) the articulation of visions of the future, and ii) the formulation of recommendations and options for action. These first two intermediate effects may be summarised under the policy advisory function, and were clearly achieved through the reports generated by the various projects

launched in the course of the UK foresight round 2002. A third intermediate effect is the formation of action networks, which already points towards impacts in terms of policy implementation. However, evidence is less conclusive concerning the formation of action networks, which seems to be highly dependent upon the sponsor agency, and hence much more needs to be done to render them self-sustaining.

Ultimate effects include influence on research agendas of both public (the UK Research Councils, UK government policy) and private actors (industry), and may be observed in the range of policy counselling and policy implementation. Effects in the public domain are evident in the stimulation of new areas of work within existing programmes and fora, rather than the formulation of whole new programmes. Ultimate effects are a lot more difficult to trace in the private sector. First, the private sector features less prominently in the current UK foresight round. Second, foresight impacts in industry do not manifest themselves in publicly accessible documentation. What remains is anecdotal evidence of participants from industry that foresight activities are perceived as successful and interesting events.

#### **A Brief Overview of Policy Impacts in the UK**

The second round of foresight in the UK was organised in different projects, which vary considerably in their impacts on policy making.

The foresight project on cognitive systems (CS) was not intended to directly exert influence on policy (other than research policy, by offering funds for cross-disciplinary proposals building on the CS project). (PREST, 2006, p. 37)

The flood and coastal defence (FCD) project was used heavily to inform the sponsoring ministry's (Defra) long-term strategy on flooding. It has provided a route map as a result, a map for Defra to use in policy development and decision making. Furthermore, the HM Treasury stresses the important contributions of the project for the Spending Review (SR) 2004, which ensured the high level of funding for flood management allocated in SR 2002. (PREST, 2006, p. 43 ff)

In the one-year-report of the project on cyber trust and crime prevention (CTCP) on its impacts on government policy making, mention is made of workshops using the project scenarios of CTCP, also of CTCP contributing to the definition of fraud and to the Cabinet Office's development of a Strategy for Information Assurance. The DTI Innovation Group's newly forming priority on cyber security presumably relies to a large part on CTCP. However, some interviews suggest that the policy impacts of CTCT may be limited or delayed due to factors outside CTCP e.g. the turnover of the responsible minister. (PREST, 2006, p. 49 ff)

The foresight project on exploiting the electromagnetic spectrum (EEMS) was aimed at assessing the research field in terms possible commercialisation. It exerted some influence on the calls of the Research Councils and of DTI's Technology Programmes, but Foresight in general is just one of the many inputs DTI uses to identify areas to support. Yet, the response from the community to the calls was below expectation, which suggests that it is an area still somewhat off readiness for commercialisation. (PREST, 2006, p. 56 ff)

The project on brain science, addiction and drugs (BSAD) identified possible contradictions in the current policy, with current a possible future developments. The responsible ministry has already used the outputs. However, as the project was launched in 2005, the views of those interviewed were that it was still too early to speculate on longer-term impacts on policy. (PREST, 2006, p. 61 ff)

#### *5.2.2 eFORESEE in Malta*

The foresight exercise carried out in Malta in 2002-2004 was conducted in the context of a political system undergoing fast pressures of change in the critical phase of pre-accession to the European Union. The assessment of the exercise revealed that the impacts that are particularly elaborated on are the ones related to the project *Malta's Knowledge Futures in ICT and Education Pilot*. The main targeted output here was a vision of Malta in 2010. Furthermore, the pilot used five edged and well identifiable success criteria as objectives and measures of achievement.

In the domain of policy informing, the objectives were to develop high quality scenarios worthy of publication and the involvement of new actors beyond the established players in the field. Concerning policy counselling, the objectives were to identify textual modifications or inputs in the National Development Plan, a specific reference and follow-up activities in the NDP, resulting from the foresight exercise. With respect to policy implementation, the objectives were the development of action plans worthy of publication, bringing to the table in the form of a 'core group', the main high-level visionaries and strategic planners in Malta, and the formation of new public-private partnerships that would take action on business opportunities identified via this exercise.

An evaluation has concluded that the objectives have been met, the main policy development being the launch of an updated RTDI Strategy (2003-2006) and its implementing tool, the RTDI programme. The foresight exercise

has been instrumental in identifying the key weaknesses in the national system of innovation, which, in turn, have been targeted by the RTDI programme. (Cassingena Harper and Georghiou, 2005, pp. 94 ff)

Several major unforeseen impacts that came to the fore during the implementation phase have also been identified:

- Activation and support of fast policy learning and policy unlearning processes.
- Engaging able new actors and integrate them in a consensus-oriented dialogue.
- Identification of hidden obstacles to the introduction of more informed, transparent, open participatory processes to governance.
- A shift from the targeted set of objectives set at the beginning of the exercise to the informal or societal goals, which also formed part of the task. The shift was made when in the course of the exercise it became clear that in achieving the objectives targeted in the outset, work had also to be addressed the set of goals related to the socio-cultural context.
- Increased awareness of science, innovation and technology policy concerns among local players. This impact was accelerated as the exercise was highly inclusive and sought to engage actors at all levels (strategic players, politicians and policy-makers as well as experts in the fields of social and natural sciences).
- Increased awareness of the need for consensus-building approaches in long-term vision-setting exercises if policies are to prove sustainable.
- Foresight spin-off activities in various disciplines, as some of the panel members responded proactively to the issues under discussion and embarked on their own foresight activities. (e.g. FutureChild, theatre foresight, tourism foresight, etc.)
- Investments in foresight training in order to ensure the quality of foresight processes and results.
- The adoption of foresight contents in the research and teaching agenda of the University of Malta. (Cassingena Harper and Georghiou, 2005, p. 99 ff)

### 5.2.3 *The Technology Foresight Programme in Hungary*

The Hungarian Technology Foresight Programme (TEP) proceeded from 1997 to 2001, as the first experience of a full-scale national foresight activity in a transition economy. The Steering Group and the seven thematic panels assessed the current situation, outlined different visions for the future, and devised policy proposals. The thematic panels analysed the key aspects of the following areas: human resources; health and life sciences; information technology, telecommunications and the media; natural and built environments; manufacturing and business processes; agribusiness and the food industry; transport. Their main concern was to identify major tools to improve the quality of life and enhance international competitiveness, and thus they emphasised the significance of both knowledge generation and exploitation.

TEP was evaluated by an international panel in 2004. (Georghiou *et al.*, 2004) It was Central part of the evaluation was a survey which produced 62 responses. According to the survey respondents, the most important effects were mainly in the area of cultural changes – establishing longer-term perspectives, and introducing greater inter-disciplinarity were the effects which stood out most in their rating of importance. Both effects may be interpreted as part of the policy informing function, the first effect also as part of the policy facilitating function. However, the effects achieved in terms of the original objectives were seen as quite weak, particularly influencing the research directions of industry or the public sector. It also had an effect on the climate of thought as it introduced longer-term holistic thinking in a period when the country was dominated by a short-term agenda (partly because of economic challenges but also as an opposition to the long-term planning in the political past). (Georghiou *et al.*, 2004, p. 4 ff)

With respect to policy counselling, the effects of the Hungarian foresight on public policy are apparent now, but they took much longer than expected to materialise. (Havas 2003a) The process behind this materialisation was a “slow and non-linear process”. (Georghiou *et al.*, 2004, p. 5) In various policy areas (e.g. strategic documents by the Prime Minister’s Office, transport policy, the national health programme, environmental policy, IT policy) do statements, recommendations, sometimes exact passages, reflect results from TEP. It seems that the reservoir of knowledge created by TEP unevenly entered the policy making processes, either through personal networks or simply because there was a conclusive text available when policies were being drafted. (Georghiou *et al.*, 2004, p. 5)

A few more impacts can be observed since the evaluation exercise was conducted. The broad visions presented in the first National Development Plan (2004-2006) have relied heavily on the so-called macro visions published

in the Steering Group report of TEP. Further, the first ever STI policy strategy, approved in March 2007 by the government, is also making explicit reference to these macro visions.

#### 5.2.4 *The Second Technology Foresight Programme in Sweden (TF2)*

In Sweden, the foresight process took place in 2002-2004, and it was evaluated by an international team in 2005. The evaluation report states that organisations (research organisations, consulting agencies, and foundations) appear to be the main winners and users of the results. (Arnold *et al.*, 2005) There is little sign of direct influence at the decision-making or political level (in our terminology: the policy counselling function). However, there has been a considerable overlap between various undertakings in the domain of research and innovation policy: TF2, the Research Bill and the national innovation strategy *Innovativa Sverige* were all devised in the same time. (ibid, p. 23) In their interviews, civil servants argued that the results of TF2 were not well marketed in the policy-making system, and that the synthesis report was produced well after the 'window of opportunity' to influence the Research Bill. Concerning the policy informing function, it was argued that the synthesis report was perceived to be party-political, which undermined its credibility. (ibid, p. 28) The most obvious impact of TF2 was the organisation of a series of fora for young people to debate the future.

### 5.3 *Key issues from the foresight impact analyses*

As an overall assessment of its impact, Foresight is a useful decision-preparatory tool, as suggested by its wide-spread use across continents, as well as by theoretical considerations. Foresight can assist decision-makers in tackling a number of complex challenges: it can reduce technological, economic or social uncertainties by identifying various futures and policy options, make better informed decisions by bringing together different communities of practice with their complementary knowledge and experience, obtain public support by improving transparency, and thus improve overall efficiency of public spending. (Havas 2006) However, network-building effects are at least as important as the actual results of the process. The added-value of foresight increases when it is possible to overcome traditional sectoral/ disciplinary barriers and to succeed in engaging able new actors beyond the established and well-known players in the field. This forges novel linkages within the innovation system and increases the recognition of the foresight topic area among the various players.

The results of evaluation exercises conducted so far also indicate that there are a number of key issues that can either hamper foresight from being effective in exerting an influence on policy-making, or significantly enhance their impact.

#### *Enrolment of able new actors and formation of actor networks*

According to the participants of many foresight processes, the network-building effects are at least as important as the actual results of the process. The added-value of foresight increases when it is possible to overcome traditional sectoral/ disciplinary barriers and to succeed in engaging able new actors beyond the established and well-known players in the field. This forges novel linkages within the innovation system and increases the recognition of the foresight topic area among the various players.

#### *Interested customers with absorptive capacities*

A key problem experienced was the linkage between the foresight activities and its clients. Interested customers with absorptive capacity are a precondition if foresight is to affect policy. In Sweden, the foresight results seem to have difficulty to compete with the abundance of other reports, as civil servants do not have the resources to work themselves through quantities of reports. (Arnold *et al.*, 2005) In the UK the responsible minister was personally involved, which provided a focus and a clear indication of priority and importance of the exercise, and quite likely this factor increased the time resources civil servants devoted to the absorption of the results. (PREST, 2006, p. 19)

#### *Ownership of results*

The more path-breaking and revolutionary the results of the foresight process are, the more likely their implementation interferes with the competences of several departments or even ministries. This seems often to be the reason why recommendations derived from the foresight process lack commitment to acting upon them. In Hungary, TEP produced a long list of recommendations, which are sparsely implemented. (Georghiou *et al.*, 2004, p. 4 ff.) In Sweden, implications of the synthesis report were so wide-ranging that they were beyond the scope of individuals, units or even ministries. (Arnold *et al.*, 2005, p. 28)

*Time horizon*

A time horizon slightly beyond the concerns of even strategic policy decisions allows more “out-of-the-box” thinking and creativity in exploring the future and its implications. There is obviously a trade-off between creative, long-term thinking and the likelihood of having an immediate impact on decision-making.

*The Congruence of Actors in Foresight and Political Advice*

The actors, individuals and groups, who inform and advice ministries in their decisions and priorities are often the same that take a lead part in the foresight processes. This makes it especially hard to judge the impact of the foresight activities, even if political programmes and resolutions obviously reflect foresight results. In the extreme, this leads to the conclusion of OST about the UK foresight activities that “in the absence of Foresight, some or all of the successful outcomes might very well have transpired in part or at a later date.” (Keenan, 2000) This argument presupposes that the ideas expressed in the foresight exercises “were around” anyway. Yet, there is a difference between ideas of visionary individuals that somehow find their way into opinion-forming or decision-making processes and the development of a vision in a foresight exercise, a vision that has been created jointly and that is shared by a broader constituency. This difference has major implications with respect to the ownership of results, and thus with respect to the likelihood, efficiency and efficacy of implementation.

## 6 Conclusions and recommendations

Foresight is a useful decision-preparatory tool, as suggested by its wide-spread use across continents, as well as by theoretical considerations. Foresight can assist decision-makers in tackling a number of complex challenges: it can reduce technological, economic or social uncertainties by identifying various futures and policy options, make better informed decisions by bringing together different communities of practice with their complementary knowledge and experience, obtain public support by improving transparency, and thus improve overall efficiency of public spending.

Foresight can be applied for all sorts of decision-making processes (businesses, research institutes, professional associations, NGOs, etc) – but our paper has been mainly concerned with the role of foresight in shaping public policies.

Foresight should not be conducted for its own sake – just because it is becoming “fashionable” throughout the world, and currently being promoted by international organisations. It is crucial to prove the relevance of foresight for decision-making: its timing and relevance to major issues faced by societies, as well as the quality of its ‘products’ – reports and policy recommendations – are critical. Only substantive, yet carefully formulated proposals can grab the attention of opinion leaders and decision-makers, and then, in turn, the results are likely to be implemented. Otherwise all the time and efforts that participants put into a foresight programme would be wasted, together with the public money spent to cover organisational and publication costs. The so-called process results – e.g. intensified networking, communication and co-operation among the participants – still might be significant even in this sad case, but they are less visible, and much more difficult to measure. Thus, the chances of a repeated programme – when it would be due again given the changing environment – are becoming really thin.

Foresight can be a useful tool in a number of policy fields – well beyond science, technology and innovation. It is time to embrace this broader notion of foresight, and especially in the CEE countries and other emerging economies, facing daunting tasks in a number of fields of socio-economic development.

International co-operation in foresight can raise awareness among the stakeholders, and also enhance the chances of success by sharing lessons, easing the lack of financial and intellectual resources through exploiting synergies and economies of scale. International organisations can also facilitate foresight programmes in emerging economies, and in particular collaboration among them. It is crucial, however, to maintain the commitment of local actors, e.g. in terms of time and funds devoted to the programme, willingness to implement the results. In other words, the main forms of foreign assistance should be the provision of knowledge-sharing platforms and other fora to exchange experience (among emerging economies as well as with advanced countries), monitoring and evaluating foresight initiatives in the CEE region and other emerging economies.

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<sup>1</sup> This understanding of foresight builds on the UK foresight tradition as begun by Martin and Irvine (1989). Today, earlier technology forecasting approaches like the large Delphi surveys introduced in Japan in the early 1970s and later on adopted by Germany and other countries are often subsumed under the 'foresight' heading. For our purposes, however, the distinction between foresight and forecasting is useful.

<sup>2</sup> Participatory and constructive approaches are increasingly applied in technology assessment activities, too, given the growing prominence of social, economic, environmental and ethical concerns related to scientific and technological developments. (Decker and Ladikas, 2004; Joss and Bellucci, 2002; Rip *et al.*, 1995) Here, the aim is to negotiate consensus on risks and opportunities or at least achieve transparency about conflicting viewpoints, in order to contribute to a normative debate on desirable future development paths.

<sup>3</sup> Obviously, there are also certain types of foresight exercises that have a less pro-active intention by concentrating on the identification of future challenges and issues only rather than aiming at solutions.

<sup>4</sup> See the study on methods and dimensions of impact assessment by Rhomberg *et al.* (2006) and in particular the still ongoing work on self-evaluation tools for foresight in the context of the ForSociety ERA-Net (ForSociety 2007).

<sup>5</sup> It should be noted, however, that not all exercises included in the EFMN database would qualify as "foresight" in the sense of the definition used in this paper – quite a few of them would be other types of prespective or strategic analyses.

<sup>6</sup> This is the case, for instance, for cognitive sciences and energy in the context of the European Foresight Monitoring Network (EFMN), but also for ICT (see the analysis conducted in the context of the FISTERA project) and other sectorally focused foresight projects at the European Union level.

<sup>7</sup> An evaluation of the German Futur process has been conducted, but not published. A short account can be found in Cuhls and Georghiou (2004).

<sup>8</sup> [http://trendchart.cordis.lu/scoreboards/scoreboard2005/docs/EIS2005\\_database.xls](http://trendchart.cordis.lu/scoreboards/scoreboard2005/docs/EIS2005_database.xls)