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Interpreting foresight process impacts: Steps towards the development of a framework conceptualising the dynamics of 'foresight systems'

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Abstract

Foresight programmes are usually evaluated in terms of the achievement of initial objectives and the scale and nature of direct, anticipated impacts, notwithstanding the difficulty of measuring such impacts. However, indirect and/or unanticipated impacts that fall outside the scope of specific programme goals and objectives have also been reported. These are mainly impacts associated with the foresight process itself, i.e. with the way in which foresight exercises are designed and implemented. These impacts typically fall in areas such as:

- Knowledge creation, diffusion and absorption;
- Social capital and networking;
- The evolution of strategies to cope with or escape from the negative consequences of a 'risk society'.

The diversity of the above areas suggests that foresight process impacts should be interpreted through the lenses of epistemology, sociology, political science, management science and organisational theory. In parallel, given that developments in the above spheres are strongly associated with the evolution of 'participatory knowledge societies', this paper presents an interpretation of foresight process impacts within a conceptual framework that attempts to characterise such societies.

Additionally, such an interpretation is conceived as a step towards the development of a conceptual framework aimed at understanding the dynamics of 'foresight systems'. This framework should be capable of explaining the interdependencies and inter-relationships between system elements such as actors, processes, inputs, outputs and impacts, as well as the interaction of the system with the broader socio-technological-economic-political environment.

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The overall aim of the paper is to develop an impact assessment framework for foresight exercises that assesses the degree to which they promote the development of 'participatory knowledge societies'.

The paper is based primarily on research carried out during the preparation of a PhD thesis entitled "Assessing the contribution of Foresight to a more participatory knowledge society". The research mainly involved a literature review of available documentation on past and present foresight programmes and their results.

Keywords: Knowledge society; Foresight impacts; Impacts assessment; Logic model; Networking; Actors' alignment

1. Introduction

The present article presents results to date[2] from research leading towards the production of a PhD thesis entitled "Assessing the contribution of Foresight to a more participatory knowledge society". This topic is of specific interest due to the fact that no common evaluation and assessment approach for foresight exercises has been developed to date. This is a consequence of the fact that most foresight activities, although sharing some methodological characteristics and similarities in terms of time horizons and audiences addressed, usually have different aims, scopes and levels of implementation. Thus evaluations typically focus on assessments of whether or not these goals have been attained.

The evolution of a common evaluation and assessment framework for foresight exercises, however, could facilitate the identification of good practices irrespective of their specific objectives and levels of implementation, as well as facilitating the benchmarking and coordination of policies for socio-economic development.

However, a common evaluation and assessment approach is not possible if evaluations are based on the specific objectives and needs that foresight exercises typically try to address. Another level of reference is needed, i.e. foresight exercises need to be assessed in terms of their contribution to the attainment of higher level, generic goals.

In this paper, we argue that one higher level of reference is offered by a commonly agreed goal amongst the EU Member States, namely the goal of becoming "*the most competitive and dynamic knowledge-based economy in the world*".[3]

In parallel, a further higher reference level is offered by the trend towards participatory governance. This has increased in importance in the past few years, not only in terms of the management of health- and environment-related risks, but also in terms of ensuring sustainable development.

These two 'pillars', the 'knowledge society' and 'participatory governance', can become the common framework in which to assess and compare the performance of foresight exercises. In order for this to happen, however, the major characteristics of these two 'pillars' first have to be examined and understood. This facilitates a greater understanding of the wider environment within which foresight exercises are implemented and the identification of many of the characteristics of emerging knowledge societies which foresight can affect in both anticipated and unanticipated ways.

As a starting point, a conceptual framework is presented which outlines the major characteristics of emerging knowledge societies. This is based on a review of the available literature. A further review of the literature on foresight impacts showed that many of these are in line with the societal shifts needed if emerging

[2] PhD research will be complete by Jan. 2010.

[3] Strategic goal for 2010, set for Europe at the Lisbon European Council – March 2000 (http://www.europarl.europa.eu/summits/lis1_en.htm).

knowledge societies are to flourish. Given this, there is need to develop a model capable of describing and understanding how this happens. In such a model, foresight has to be seen as a system comprised of a number of basic elements, namely actors, objectives, processes, inputs and outputs. The required inputs and outputs associated with different impacts then need to be mapped. The role of stakeholders/actors, processes and objectives also have to be studied in order to identify the principles and criteria that have to be followed and adopted in foresight exercises if these impacts are to be intentionally attained.

Furthermore, the foresight system's interaction with the wider environment has to be studied in order to identify the factors affecting the success of the whole process. A model is thus needed that links all the different variables and reference levels.

In this paper, a 'logic model' approach is used to develop an 'objectives hierarchy' describing the relationships between higher level goals, such as the evolution of knowledge societies and participatory governance systems, and the lower level sets of goals that have to be attained if the higher level goals are to be realised. In parallel, working from the bottom up, a 'logic model' approach is also used to provide checklists of the foresight inputs and activities likely to lead to the attainment of both lower and higher level system goals, together with checklists of the internal and external factors likely to affect the overall performance and goal attainment levels.

2. A conceptual framework to characterise emerging knowledge societies

The findings of the literature review on the major characteristics of the emerging knowledge societies suggest that the characteristics and factors affecting the development of these societies are intertwined with those influencing the development of participatory governance systems: what is promoted by a 'knowledge-society' is required to enhance participatory governance and *vice versa*, while foresight impacts seem to relate to both sets of developments.

The major elements reported in the literature can be grouped under three broad categories: a group comprising facts and factors increasing the *role of knowledge* in society; a group of factors leading to *innovation-based growth*; and a group consisting of what is needed to escape or cope with the negative consequences of a '*risk society*'.[4]

Notwithstanding the importance of knowledge in previous types of societies, several authors acknowledge a shift in the economic structure of modern societies away from a 'material' input driven economy towards a *knowledge-based input economy.* They associate the increasing *role of knowledge* in the emerging knowledge societies with the increased density and complexity of the ways *information and knowledge is mediated*, especially through developments in *information and communication technologies*, the increasing importance of *knowledge-based industries* and the *service* sector, and *intangible investments*. While these are considered as facts, the factors affecting the degree to which these developments are facilitated and exploited are qualitative elements such as *creativity and knowledge creation, knowledge diffusion and absorption*, and a range of related *skills and competences*, which in turn call for new organisation forms and working environments.

These factors seem to be interlinked with each other in a cycle reinforcing their development. They are considered important prerequisites for knowledge-based economic growth because knowledge-based economic growth is typically considered to be dependent on *innovation*. This in turn reveals the importance not only of *technological innovations,* but also of *social changes* and the building of *social*

[4] For an analysis of the major findings of the literature review see [1].

capital as key factors underpinning the more technical features of the knowledge-based economy and the realisation of a 'knowledge society'. In turn, the available evidence suggests that technological innovations, as well as the building of social capital, depend upon the degree to which *collaboration and networking* are facilitated within a society, within and between different groups of actors.

On the other hand, knowledge seems to have a dual, paradoxical role in modern societies, in that while increasing reliance is placed upon it, it is also being increasingly contested. Certain developments have led to undesired effects and to a decreasing trust in science, scientists and decision-makers. The paradox stems from the fact that knowledge use and creation is inherently associated with uncertainty. The issue remains that the degree to which modern societies have to deal with uncertainty and complexity marks a novel feature of today's situation. Dealing with uncertainty becomes even more complex if we consider that uncertainty, ambiguity and unpredictability have to be nurtured as wellsprings of creativity and innovation. It calls for the establishment of an environment that encourages risk taking and is characterised by reflexivity and the flexibility to adapt and respond to changing circumstances.

The literature suggests that the emerging knowledge societies are also '*risk societies*', characterised by decision-making conducted within an environment of increasingly uncertain or incomplete knowledge. Nevertheless, decisions have to be made. *Dealing with uncertainty and partial or incomplete knowledge* needs *collaboration and the strategic alignment of actors*. This is conceived both in terms of sharing knowledge and uncertainties but also in terms of identifying alternative solutions and commonly agreeing on actions to avoid undesired consequences. The alignment of actors goes beyond the usual actors in previous times (i.e. government, industry and scientists). Societal actors and the public at large are increasingly seen as stakeholders of major importance that should be involved in decision-making processes. *Social movements* have been gaining increasing importance and gravity in action and decision-making. While *active participation* is demanded in a 'risk society', at the same time it is promoted by a 'knowledge society' via support for the development of *more informed publics*. However, collaboration and the alignment of actors' efforts are dependent upon levels of *social trust*. While more knowledgeable and informed publics may not lead inexorably to greater trust in institutions, they may facilitate public engagement, which in turn can strengthen social capital. Thus, some of the factors enhancing a 'knowledge society' (social capital, networking, informed publics) seem to be necessary to cope with a 'risk society'.

The findings of the literature review on what constitutes the major characteristics of the emerging knowledge and risk societies are synthesised into a conceptual framework describing a more participatory 'knowledge society'. This conceptual framework is illustrated in Fig. 1.[5]

The three main groups of characteristics are illustrated by the three inner circles. The conditions enhancing the development of each of these three broad groups of elements are shown by the second inner circles, and the factors affecting the existence of these conditions are shown by the outer circles. The way these factors are linked to each other, based on the findings of the literature review,[6] is shown by the lines connecting the factors.

3. Contribution of foresight to the emerging knowledge societies

The above conceptual framework facilitates the identification of areas where foresight impacts may contribute to the strengthening (or weakening) of the conditions enhancing the development of a more participatory 'knowledge society'. The identification of such areas was the subject of the second part of

[5] This conceptual framework will be validated via interviews with experts in relevant fields.
[6] For an analysis of the major findings of the literature review, see [1].

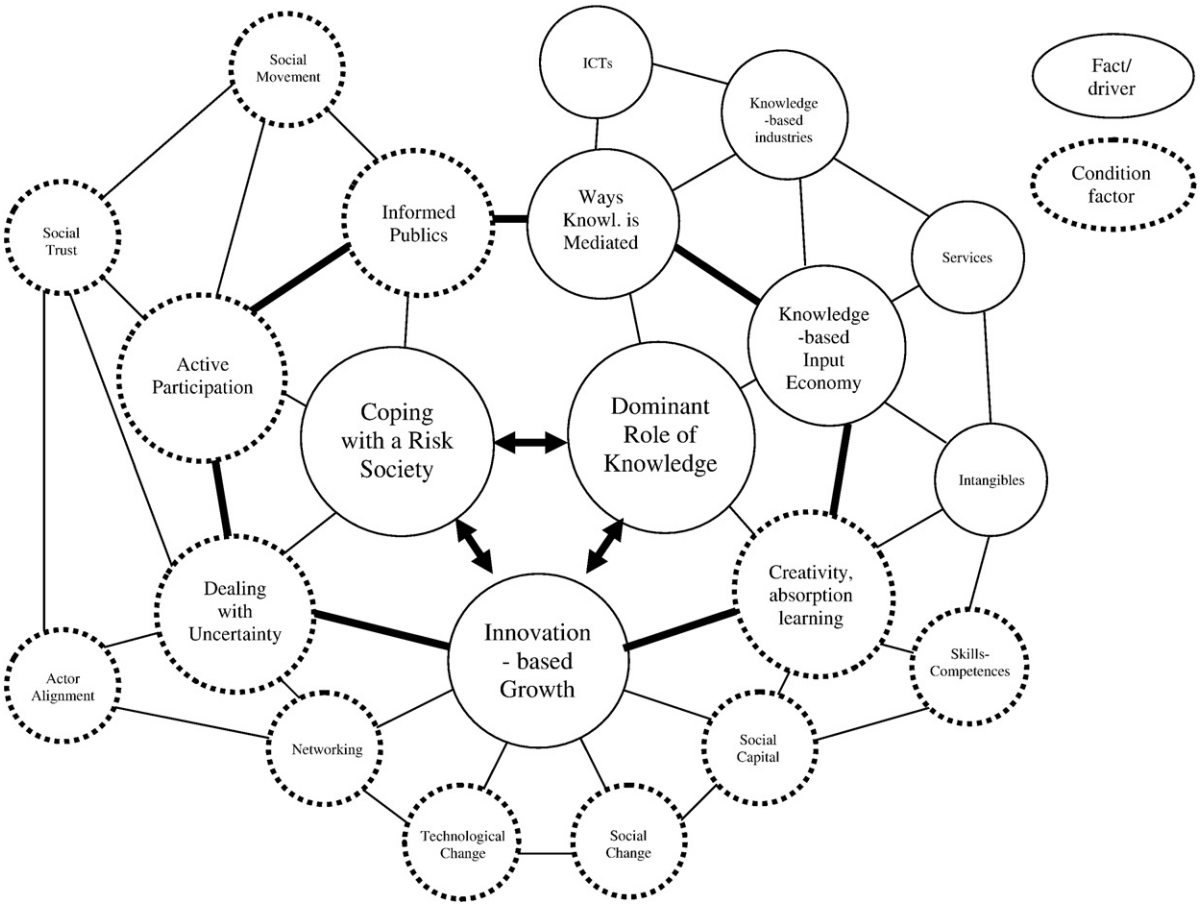


Fig. 1. Conceptual framework for the emerging 'knowledge societies': drivers and factors shaping modern societies.

the literature review, which focused on the reported impacts of foresight exercises – both intended and unintended.

The available literature[7] on foresight impacts notes that it is mainly the foresight process impacts that contribute to certain characteristics of the emerging 'knowledge society'. These impacts, however, are not usually the direct or intended ones. The *networking effects* of foresight programmes enhance collaboration and networking between organisations (universities, research institutes, firms and service-providers), which is generally held to improve the prospects for successful innovation. In parallel, *knowledge and skills*, are acquired through a variety of learning processes. Foresight is increasingly referred to as such a process, with 'hidden' or often overlooked benefits relating to learning at the level of individuals, organisations and communities.

Policy-making in the emerging knowledge societies needs to take account of *uncertainty and lack of knowledge*. It has to engage all interested and potentially affected stakeholders in this endeavour. Foresight is one such method, since it deals with uncertainty by requiring the development of alternative

[7] See for example [2–10].

versions of the future, thus facilitating the design of several plans for dealing with the consequences of different scenarios should they materialise. Apart from trying to identify potential future risks, foresight also facilitates the adoption of a holistic approach in terms of identifying possible impacts within and among different scenarios.

Foresight also acknowledges that knowledge is 'socially constructed'.[8] By bringing together all interested parties it facilitates knowledge diffusion and production among diverse groups with different backgrounds. It also allows 'non-expert' knowledge and society's perceptions, interests, concerns and fears to be taken into account. It meets the need to move beyond reliable knowledge towards 'socially robust' knowledge[9] and provides a space for knowledge representation, mediation and co-production by integrating different knowledge sources and types. Thus, it facilitates trans-disciplinary practice and 'extended peer review'[10] – an important response to the increasing complexity of scientific knowledge production. Additionally, it enforces the *active engagement* of relevant actors, strengthening their communication and collaboration via constructive discussions and joint decision-making. It enables the *alignment of all stakeholders*' endeavours such that they can influence underlying trends. Foresight can have an impact on the ways in which policy-making deals with uncertainty and lack of knowledge by promoting more participatory governance.

Foresight also encourages the emergence of the new types of affiliations and alliances needed within a knowledge society by engaging actors with different backgrounds, skills and perspectives in new forms of social interaction and networking, typically working towards a common purpose. It can thus enhance the development of *social capital*. Furthermore, foresight can help break down some of the barriers between science and society – both crucial developments if the emerging knowledge societies are to cope with social, environmental and intellectual complexity. Foresight can thus nurture the development of multi-disciplinarity in research as well facilitate the creation of *informed publics*.

Based on the above discussion, foresight processes contribute to the emergence of 'knowledge societies' in terms of:

- Knowledge creation, absorption and diffusion – and through these to the increasingly dominant role of knowledge;
- Social capital and networking – and through these to support for innovation-based growth;
- The alignment of actors' interests, their active participation in dealing with uncertainty, the development of informed publics and, through all of these, to the evolution of strategies to cope with or escape from the negative consequences of a 'risk society'.

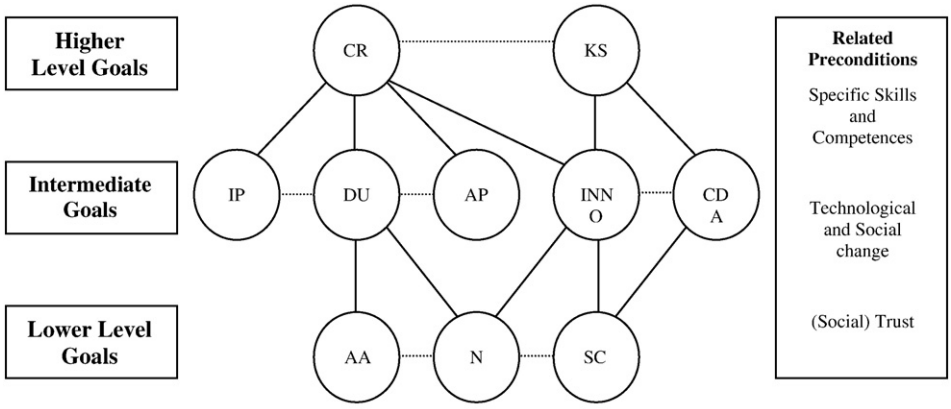
4. From the conceptual framework to an objectives hierarchy

The conceptual framework used to characterise emerging knowledge societies and identify those elements affected by foresight exercises can be regarded as a generic objectives model for foresight exercises likely to contribute to a more participatory 'knowledge society'. This in turn can be used to develop an objectives hierarchy that maps the links between the elements of the conceptual framework. This is illustrated in Fig. 2.

[8] For an analysis of the social construction of knowledge and related implications on definitions, interpretations and policy-making see [11].

[9] As defined for example in [12].

[10] See for example [13].



Higher Level Goals: CR: Coping with the 'risk society' KS: Enhancing the 'knowledge society'
Intermediate Goals: IP: Creating informed publics DU: Dealing with uncertainty AP: Promoting active participation INNO: Supporting innovation-based growth CDA: Increasing creativity, knowledge diffusion and absorption
Lower Level Goals: AA: Aligning actors N: Facilitating networking SC: Increasing levels of social capital

Fig. 2. Objectives hierarchy for foresight exercises contributing to a more participatory 'knowledge society'.

This can be enriched by taking further sub-objectives and related impacts into account, especially those reported in the available literature. Table 1 groups together many of the reported objectives and impacts associated with foresight exercises under the headings of 'intermediate' and 'lower level' goals.

5. Approach for developing an impact assessment framework

It is possible to develop an impact assessment framework based on a 'logic model' approach which links the generic goal of a participatory knowledge society with the reported impacts of framework exercises. Typically, logic model approaches start with specific programme goals and objectives and attempt to identify paths to potential goal attainment by treating foresight programmes as systems comprised of a number of basic elements, namely context, actors, processes, objectives and inputs, together with the principles and criteria governing their relationship with outputs and impacts (both direct and indirect) and with the broader socio-technological-economic-political environment. This approach

Table 1
Grouping of foresight reported objectives and impacts [a] under 'intermediate' and 'lower level' goals

	Reported foresight programme objectives	Reported impacts of foresight exercises
Intermediate goals:		
IP: Creating informed publics		Interest from the general public
DU: Dealing with uncertainty	Facilitate better understanding of potential disruptive change Gain insights into complex interactions and emerging drivers of change Detect and analyse weak signals to 'foresee' changes in the future Produce future oriented material for the system to use	
AP: Promoting active participation		Source of inspiration for non-governmental actors
INNO: Supporting innovation-based growth		Achievement of long-term reform of the productive system through a raised emphasis on high technology Making the case for increased investment in R&D More informed STI priorities Establishment of communication structures between innovation actors
CDA: Increasing creativity, knowledge diffusion and absorption	Facilitate thinking out of the box Challenge mindsets Overcome path dependency and lock-ins	Development of new ways of thinking Creating a language and practice for thinking about the future Collective learning through an open exchange of experiences Accumulation of experience in using foresight tools and thinking actively about the future
Lower level goals:		
AA: Aligning actors	Support the empowerment of system actors Build trust between system actors	
N: Facilitate networking	Form new networks and provoke new ones	Creation of new networks and clusters
SC: Increase levels of social capital		

[a] Based on the respective lists provided in [14].

has to be modified, however, when dealing with the attainment of generic goals that may or may not have been identified as specific programme goals.

In this instance, the starting point cannot be the rationale and objectives of the programme. Instead, the impact assessment framework has to be built the other way round, i.e. starting from the identification of potential impacts in line with the generic goal before moving 'backwards' to examine the degree to which programme design and implementation affect the final result. The relevant hypotheses to test do not follow the usual pattern of asking whether and to what degree objectives have been met and expected impacts achieved. Instead, it is more relevant to ask whether particular impacts in line with the generic

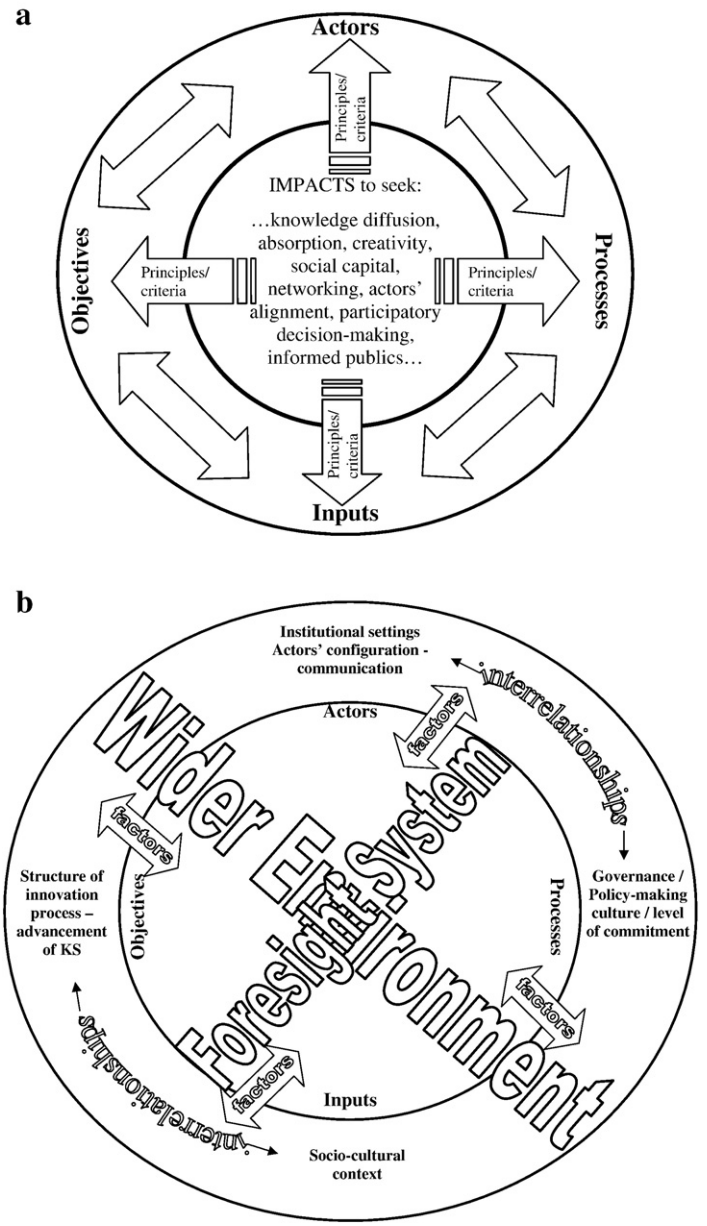


Fig. 3. a: An approach for developing an impact assessment framework – the foresight system. b: An approach for developing an impact assessment framework – the wider environment.

goal can be identified and what factors lead to and influence their appearance within specific foresight contexts (seen as systems comprised of actors, objectives, processes, inputs and principles/criteria governing their relationship with outputs and impacts). In this way, it should be possible to identify the

principles that a foresight exercise should adopt in order to achieve impacts in line with the generic goals, along with the criteria to be used when assessing foresight exercises.

Fig. 3a demonstrates how the approach starts from the inner cycle in the diagram, focusing first on impacts before moving 'outwards' (or 'backwards') towards the basic elements of the foresight system.

Moving a step further, the wider environment also needs to be examined with the same logic in order to identify the factors enhancing specific foresight impacts. A review of the available literature on factors affecting the results and impacts of foresight programmes[11] identified four main groups of factors:

- Institutional structures and settings (including the configuration of actors and institutions and communication between them)
- Governance and policy-making culture (including levels of commitment)
- Socio-cultural factors in relation to public participation and the perceived utility and eventual impacts of foresight exercises
- The nature of innovation processes and the 'innovation system' in which these processes are embedded (including the state of development of extant 'knowledge societies').

The focus thus shifts from what happens within a foresight system (Fig. 3a) to a new focus on the way a foresight system affects, and is affected by, the wider environment in which it operates (Fig. 3b).

A conceptual framework of this nature sheds light on the dynamics of foresight programmes and helps identify the principles and criteria that govern the design and implementation of foresight programmes capable of contributing to a more participatory 'knowledge society'. It can also guide the development of an impact assessment framework. If the system variables turn out to be highly contextual, then the possibility of building a common impact assessment framework for foresight exercises based on their contribution to a more participatory 'knowledge society' – irrespective of their specific context and objectives – will be very limited. If some system elements are contextual but others are independent of the context and specificities of the cases examined, then it will be possible to construct a common impact assessment framework. This framework should allow for the more sophisticated design and implementation of foresight programmes by adding design and implementation principles to the existing evaluation issues of efficiency, effectiveness, appropriateness, sustainability and additionality.

6. Understanding the dynamics of foresight systems in three countries

A first attempt to understand the dynamics of foresight systems can be based on the evaluation of three foresight exercises; the third round of the UK foresight programme, the second round of the Swedish foresight programme and the eFORESEE project in Malta.

The evaluation of the latest UK Foresight programme [5] sheds light on several direct and indirect impacts and highlighted several factors that affected the overall success of the UK foresight exercise. The evaluation found that the initiative had succeeded in its attempt to provide the neutral, interdepartmental and interdisciplinary space needed for forward thinking on science-based issues. Impacts were grouped

[11] See for example [2,3,8,15–17]. It should also be noted that the literature on technology assessment programmes is also relevant to the case of foresight programmes. See especially [4].

in three categories: immediate; intermediate; and ultimate. In terms of immediate impacts, the areas under study benefited from increased recognition, while new combinations of experts and stakeholders were also brought together. Intermediate impacts included the development of visions of the future; recommendations and options for action; the creation of action networks; and the ownership of action plans by stakeholders and sponsors. In terms of ultimate impacts, the exercise influenced research agendas in the science base and in industry and influenced the shape and course of government policy. Moreover, the strength of a foresight culture and capability was further increased and a 'reservoir' of knowledge was created which can be drawn upon whenever the need arises.

In terms of factors that affected the implementation of the process, its outcomes and its overall success, the evaluation revealed that institutional settings and attitudes within public institutions strongly affected expectations and the uptake of foresight results. The importance of high-quality inputs and outputs was also noted. Moreover, the evaluation confirmed the stance that foresight exercises should have a specific 'client', and thus a specific focus, rather than multiple and diverse clients and objectives. Changing political circumstances and the turnover of senior foresight managers or members of foresight directorates were also mentioned as factors adversely affecting the positioning of foresight in the policy-making arena. The evaluation noted too that public consultation at an earlier stage would have benefited particular topics and suggested the inclusion of some elements of 'technology assessment'. Concerning networking-related effects, the evaluation stressed that aftercare was needed if the action networks formed were to become self-sustainable, but also acknowledged that this was dependent upon the enthusiasm of the sponsor agency, the social capital of the actors involved and their community and capacity building capabilities.

The evaluation of the second round of the Swedish Technology Foresight initiative [6] found that indirect effects on foresight capabilities were more marked than the anticipated impacts of foresight results on policy-making. Increased foresightedness and networking were noted as particularly important impacts.

In terms of factors affecting the success of the initiative, the evaluation pointed out that the lack of a specific 'client' was unfortunate. Even though neither the second nor the first round were organised by government but by a consortium of agencies, the first round was much more focused. It was a technology foresight exercise explicitly aimed at the industry and education ministries and their agencies. In this sense, it addressed specific clients.

Compared with the 'technological' orientation of the first round, the second round had a greater 'social' orientation. The first round led people to understand that technology is socially shaped, and the need to widen the scope of the second round was acknowledged. The organisers regarded the results of the first round as a starting point for wider discussion of more social orientation. This meant, however, that 'everyone' became the audience, and the second round exploited less formal and rigorous methods and produced results of potential interest to multiple parties. This very diversity, however, increased the difficulty of connecting results with specific customers.

The first round included an extensive dissemination phase, lasting for about two years, and received a lot of publicity, with the Prime Minister giving the keynote speech at its conference. On the other hand, the second round, which echoed political discussions that were occurring more widely in Sweden at the time, did not manage to attract the same level of publicity and its dissemination phase was not as impressive. However, the evaluators considered that even significant dissemination activities could not replace the importance of addressing clearly defined clients and audiences if foresight is to affect policy-making.

The evaluation was critical of the intervention logic, which was not well worked out, and the objectives of the exercise, which were not clearly articulated. The evaluation suggested that foresight might need to be done in parallel at different levels with different customers. It characteristically noted that interested customers with absorptive capacity were a precondition if foresight is to affect policy.

The Swedish foresight initiative also demonstrated that the timing of an initiative has a critical influence on its ability to affect policy. The evaluation also highlighted the fact that broader environmental factors can influence the success of a foresight exercise. Important factors in Sweden were the fact that the value of a consensus view is considered higher than in other political systems (a positive factor); and the existence of a certain degree of fragmentation in the Swedish policy system (a negative factor). The legitimacy of the exercise was also questioned. The involvement of industrial organisations as sponsors was perceived by ministry people as an indication that the exercise was no more than a lobbying device. On the other hand, other stakeholders suggested that the greater involvement of ministries would also have undermined legitimacy by turning the exercise into an outlet for government policy and opinion. In explaining these attitudes, the evaluators noted the Swedish tradition of expecting people always to represent the organisations to which they belong rather than acting in personal capacities.

The evaluation of the eFORESEE Foresight exercise in Malta [7] highlights even more the value of the foresight process as an agent of cultural and behavioural change. Seen in the context of a transition economy and a political system under extreme pressure to embrace change during the EU pre-accession phase, the eFORESEE project managed to identify gaps, establish fora and exploit the connections needed to keep issues identified as important at the forefront of the national agenda. This was considered a key achievement, even if the initiative was less successful in terms of outlining strategic options and suggesting solutions. The evaluation also revealed the value of a one of the less-emphasised benefits of foresight exercises, namely their ability to make participatory processes and structures more open and transparent, and to bring to the fore hidden obstacles, key challenges and key individuals or 'project champions'.

The Malta case is a good example of an inclusiveness approach involving a wide variety of actors and extensive media promotion that raised the profile of science, technology and innovation on the national agenda. The evaluation noted, however, that socio-cultural factors made the implementation of consensus-building quite challenging. In particular, Maltese society is characterised as highly divisive and individualistic. Efforts were made to bridge numerous divides between the public–private sector, between political parties, between scientific disciplines and between generations. The raised awareness of the need for consensus-building approaches in long-term vision-setting exercises in order to ensure the sustainability of resultant polices was acknowledged as another unforeseen impact of the exercise. The Maltese case is also a good example of the high returns on investment associated with foresight training. This training not only ensured the quality of foresight process and its results, but also helped embed a wider and deeper foresight culture and offered an example to other countries embarking up the foresight learning curve.

Based on the above findings, detail can be added to the two previous figures via the addition of elaborated sets of governing factors and design principles and criteria. These are shown in Fig. 4a and b.

7. From the impact assessment framework to the logic model

The above framework can be further enriched by findings from studies of other foresight exercises in different countries, thus providing comprehensive lists of criteria and important factors in different conditions and environments.

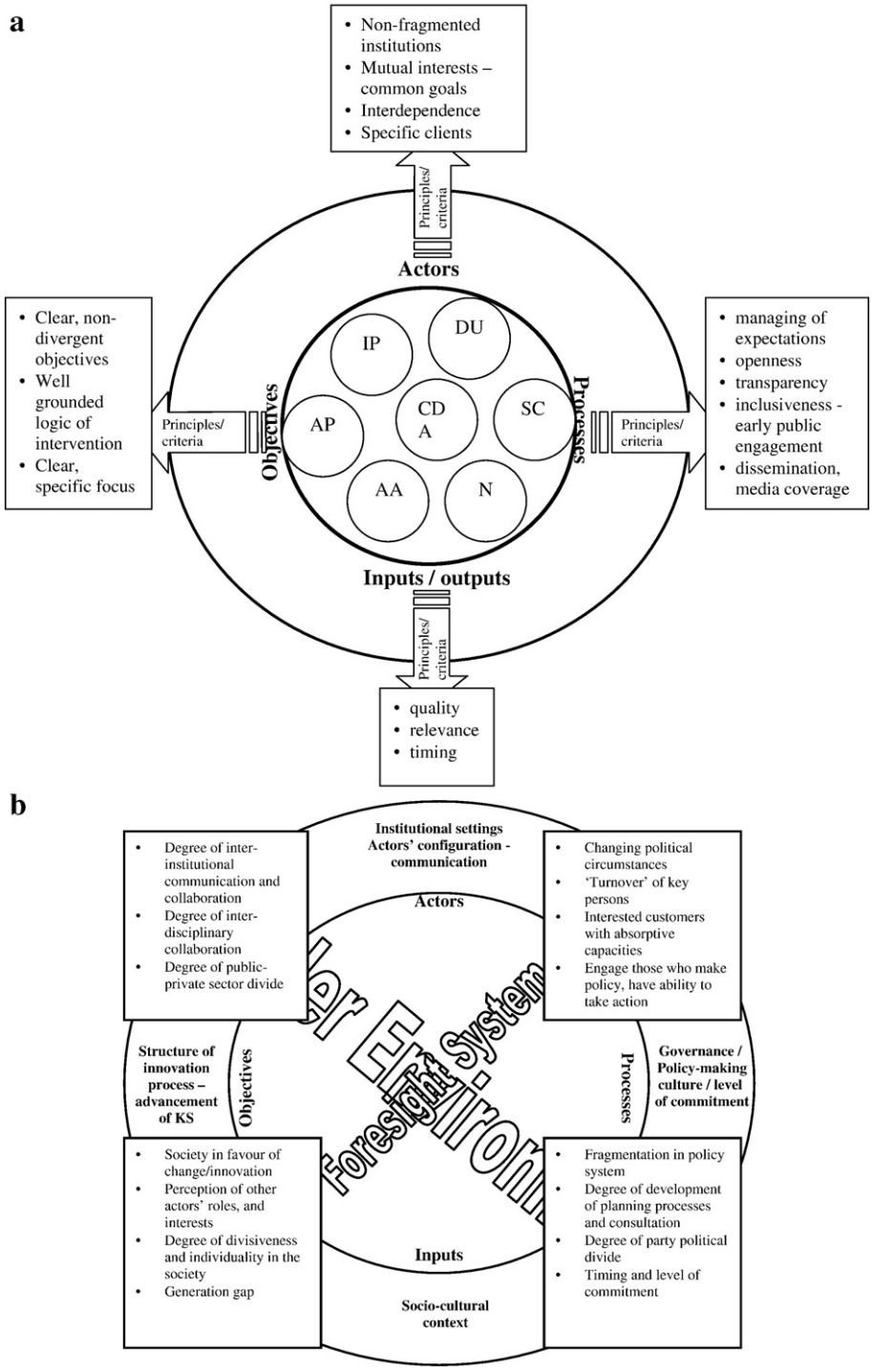


Fig. 4. a: Impact assessment framework – foresight system (based on the cases of UK, Sweden and Malta). b: Impact assessment framework – wider environment (based on the cases of UK, Sweden and Malta).

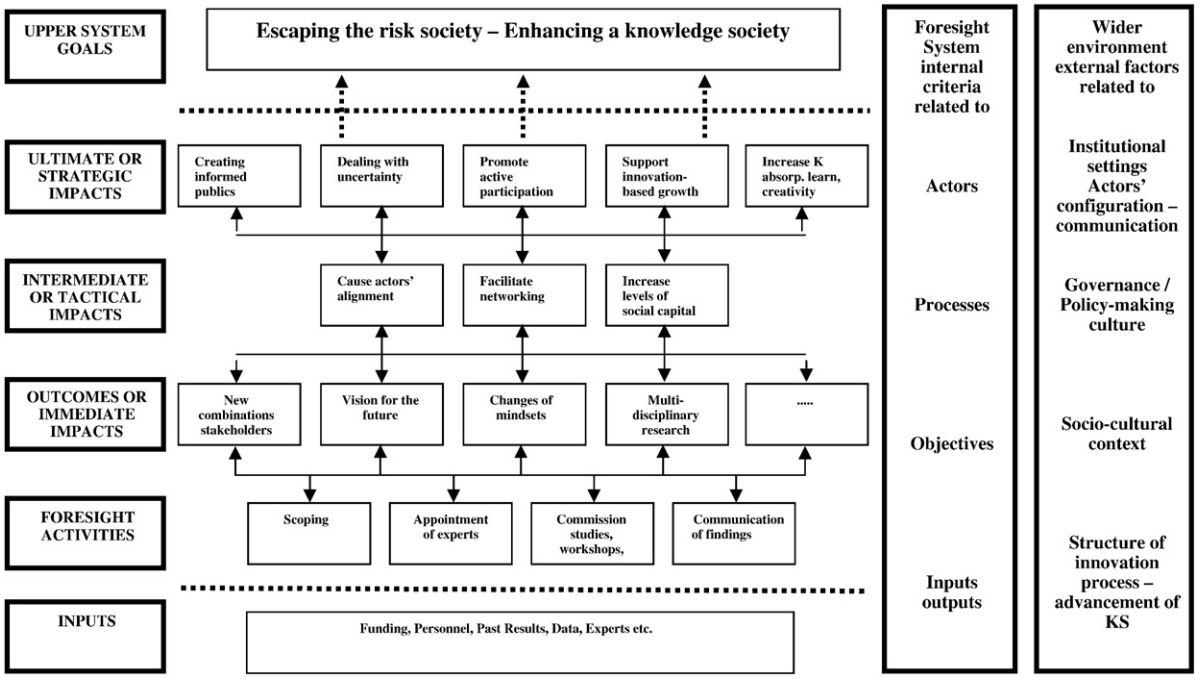


Fig. 5. An impact assessment framework for foresight systems capable of enhancing a more participatory 'knowledge society'.

Given that all the elements of a foresight system can now be identified, as well as the interactions between these elements and the factors affecting the operation of the system, a logic model approach [18] can be used to build an impact assessment model incorporating the two previous models illustrated in Fig. 3a and b. This model is depicted in Fig. 5.

8. Impact area specificity: networks and actor alignment

Given the peculiar nature of the task at hand, namely the search for diverse impacts (from changes in social capital to more informed publics and better networking) that may or may not have been targeted in the first place, a finer level of analysis is required. Given the diverse nature of the impacts in question, it is wise to study each of these impact categories separately, attempting to develop the impact assessment framework within each distinct category. For the purpose of the present article, the area of networking and actors' alignment is discussed.

A great deal of discussion has taken place about whether networks are a new form of governance coordination, lying somewhere between markets and hierarchies [19–21]. Several analytical tools have also been developed in this area, e.g. social network analysis [22], transaction cost analysis [23] and actor network theory [24,25]. All try to analyse the nature of networks. Whether networks are radically different from markets and hierarchies is still a moot point, however, since markets and hierarchies have always had networking elements associated with them.

There is a convergence of opinion, however, concerning the factors necessary for networks to be created and sustained. The factors motivating the creation of networks are summarised by Baker [26] as (a) pressures to access know-how and promote new knowledge and learning; (b) coping with greater

competition, crowding and speed; (c) obtaining complementary competencies; (d) managing uncertainty/risk; and (e) improving flexibility and complex adaptation. The factors facilitating networking are (a) enhancing organisation position and reputation; (b) trust; (c) opportunities from ICTs; (d) the degree to which government and regulatory contexts promote networking.

These findings are mainly based on studies in industry and the private sector in general. Another perspective, coming from public administration [27], notes that low dependencies and common goal-setting are two major factors facilitating the networking of public administration institutions. While in hierarchies the most important control mechanism is authority, in network operation trust seems to be the most important attribute (Bradach and Eccles, 1991 as quoted in [27]). Network operation has to find a balance between flexibility and coordination efficiency, while also having to tackle problems of legitimacy, accountability and implementation. Thus the author concludes that in those cases where these elements are most important, then hierarchies are better applied. Increased networking shouldn't be sought when the dependencies among institutions are high. However, it can work in cases of diminishing rivalry or the pursuit of a common vision. As in the private sector, networks involving public administrations are primarily constituted for the purposes of learning, the development of expertise and the exploitation of complementary resources and know-how.

From a socio-technical perspective, Molina [28] studied networks and alignments in large-scale European projects using the 'socio-technical constituencies'[12] approach of organisational behaviour theory. He claims constituencies differ from communities and networks, because these refer to people or institutions alone, and also from actor-networks, which put both animate and inanimate 'actors' in the same category. Socio-technical alignment comes into play when technical and social factors and actors come together in a close or loose interaction. Common interests, empathy and complementarity create alignment within a constituency, whereas tensions and disharmony in a constituency create misalignment and can trigger realignment.

Large-scale programmes are likely to involve alignments along several dimensions, e.g. the alignment of potential technological solutions within the emerging constituency and widely recognised technical and market trends and standards; or between the players initiating the constituency-building process and potential or target constituencies such as suppliers and users.

While the incompatibility and non-complementarity of actors' areas of expertise within a constituency are major sources of potential misalignment, human and social factors also cause misalignment between and within constituencies. Alignment between people presupposes alignment of perceptions and goals, which does not necessarily mean consensus. 'Perception-alignment' is established when the parties accept each other's interpretations of their respective motives and goals, which need not be the same. However, 'goal-alignment' develops when there are common or complementary aims to be pursued, which implies a convergence of interests and the anticipation of mutual benefits. Perception-alignment reflects the effectiveness of communication, while goal-alignment involves both communication and collaboration. In all of this, people's perceptions and concepts such as bounded rationality are crucial. Bounded rationality (which simply acknowledges that an individual's perception is limited and selective) is determined by limitations of knowledge and

[12] Socio-technical constituencies are defined as "dynamic ensembles of technical and social constituents – machines, instruments, institutions, interest groups – that interact and shape each other in the course of the creation, production and diffusion of specific technologies" ([28] pg. 387).

information, but also by people's wants, motives, personalities, experiences, value systems, wishes, hopes, expectations, beliefs, feelings, attitudes, needs and concerns. Furthermore, since organisations are not isolated from the environment in which they exist, the cultural context also plays a determining role. Perceptions and goals may change over time. Two processes thus facilitate alignment within constituencies:

- consultation and communication concerning the nature of perceptions and goals and the possibility of aligning existing perceptions and goals by maximising collaboration and minimising competition;
- an awareness of changing circumstances and their ability to alter existing perceptions and goals, thus generating alignment where none existed before;

As Molina concludes "*the key is to generate a climate of positive thinking. There seems to be a subtle psychological transition from making positive contributions to the discussions to becoming active members of the constituency. As a rule, the more the expertise/visions/interest of contributors become part of the programme, the more the programme is likely to become part of the contributors. The difficult part is to make the contributions converge into a manageable and realistic programme, while saving off negative and diversionary moves*." ([28], pp. 406).

Going back to Fig. 4a and b, the above discussion can shed some light firstly on the criteria/principles that should govern the elements of a Foresight (internal) System, and secondly on those factors in the Wider (external) Environment likely to induce positive impacts in terms of networking and actors' alignment. As regards the Foresight (internal) System, the actors can and should be characterised by inter-institutional communication and collaboration, mutual interests and low dependence. Foresight processes should also be designed in such a way as to ensure inclusiveness, flexibility and the sustainability of the networks created. The inputs and outputs should exploit the compatibility and complementarity of the available areas of expertise. The foresight objectives should reflect goal alignment and the mutual benefits and interests of the interested actors.

Referring to the Wider (external) Environment, certain factors can be identified that have to be examined in order to define the degree to which foresight exercises can achieve impacts in networking and actors' alignment. Concerning institutional settings, the degree to which there is inter-institutional communication, collaboration, dependencies among institutions and goal alignment is important. As regards governance, the degree to which government and regulatory contexts promote networking is another success factor. Concerning the social-cultural context, it is trust, peoples' perceptions, the possibility of their becoming aligned, and peoples' individual characteristics (wishes, motives, personalities, value systems, beliefs, attitudes, concerns, etc.) that play a role in the degree to which foresight promotes effective networking. Referring to the innovation system, important factors include the degree of alignment between the (technological) solutions proposed and widely recognised technical and market trends and standards; or between the 'inside' players and other players such as suppliers, users, consumers; or between competing and collaborating technologies.

9. Conclusions

Analysis of the major characteristics of the emerging knowledge societies suggest that the characteristics and factors affecting the development of these societies are intertwined with those influencing the development of participatory governance systems: the factors needed to promote a

'knowledge-society' are also required to enhance participatory governance and *vice versa*, while foresight impacts seem to relate to both sets of developments. The examination of foresight process impacts within a conceptual framework characterising participatory 'knowledge societies' provides indications that foresight can contribute to the emergence of such societies in terms of:

- Knowledge creation, absorption and diffusion – and through these to the increasingly dominant role of knowledge within modern societies;
- Social capital and networking – and through these to greater support for innovation-based growth;
- The alignment of actors' interests, their active participation in dealing with uncertainty, the development of informed publics and, through all of these, to the evolution of strategies to cope with or escape from the negative consequences of a 'risk society'.

This suggests that it is possible to assess foresight exercises in terms of their contribution to more participatory 'knowledge societies', which provides the higher level of reference needed to assess foresight exercises irrespective of their specific aims, scopes and levels of implementation.

The development of a common impact assessment model requires a clear understanding of the way foresight influences specific impact areas. This in turn presupposes that the dynamics of foresight exercises are understood. A model is thus needed capable of explaining the interdependencies and inter-relationships between foresight system elements such as actors, processes, inputs, outputs and impacts, as well as the interaction of the system with the broader socio-technological-economic-political environment.

The model presented in Fig. 3a and b helps to identify the main internal criteria and principles that have to be followed if foresight exercises are to result in impacts in line with the evolution of participatory 'knowledge societies'. It also helps in the identification of external factors affecting the success of the foresight system as a whole. Evidence from three foresight cases (UK, Sweden, and Malta) indicates that it is possible to identify internal criteria and external factors to build up an understanding of how a foresight system works (Fig. 4a and b). Needless to say, it is essential to complete the model with findings from other foresight exercises in different countries, thus providing comprehensive lists of criteria and important factors in different conditions and environments. This model can then direct the development of a common impact assessment framework based on the 'logic model' approach. Fig. 5 demonstrates the feasibility of this approach.

However, given the diverse nature of the impact areas in question, a finer level of analysis needs to be applied to the different areas of the impact assessment framework. It is wise to study each of these impact areas separately in order to identify case-specific internal criteria and external factors. A first attempt was made to study the specificities of the areas relating to networking and actor alignment, mainly based on organisational behaviour and governance theories. This indicated the existence of criteria and factors specific to particular impact areas that are not that visible when studying foresight impacts as a whole.

Further work in this area will study other impact areas from the perspective of relevant theories in order to identify area-specific criteria and factors that foresight exercises need to take into account when targeting such impacts. This will be done in parallel with the continued study of other foresight exercises and a series of interviews with foresight specialists to complete the development of the model describing the dynamics of foresight exercises in different contexts. The applicability of the resulting impact assessment framework(s) will then be tested via case studies.

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