Responsiveness in foresight management: reflections from the Finnish food and drink industry

Ahti Salo*

Systems Analysis Laboratory, Helsinki University of Technology,
P.O. Box 1100, 02015 HUT, Finland
E-mail: ahti.salo@hut.fi
*Corresponding author

Totti Könnölä and Mari Hjelt

Gaia Group Oy, Bulevardi 6 A, 00120 Helsinki, Finland
E-mail: totti.konnola@gaia.fi E-mail: mari.hjelt@gaia.fi

Abstract: Based on experiences from participatory foresight exercises and a recent foresight study for the Finnish food and drink industries, we elaborate three overarching objectives for foresight activities, i.e.

- improved systems understanding
- enhanced networking
- strengthened innovation activities.

We also argue that foresight is an inherently creative (and hence uncertain) activity where success depends on how adequately combinations of analytical and communicative methods are adopted in relation to possibly evolving foresight objectives. Specifically, we postulate that *responsiveness* to shifting stakeholder interests and expectations may be required in the definition and pursuit of foresight objectives; this, in turn, has implications for decision-making structures and methodological choices. Some of these implications are highlighted by describing a foresight study for the Finnish food and drink industries.

Keywords: innovation policy; participatory policy analysis; research and technology programmes; technology foresight.

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Biographical notes: The research interests of Professor Ahti Salo (MSc 1987, DTech 1992) include decision analysis, risk management, technology foresight and technology assessment. He has published extensively on forecasting methodologies and decision support tools in leading journals such as *Technological Forecasting and Social Change*, *International Journal of Forecasting*, *International Journal of Technology Management*, *Technology Analysis and Strategic Management*, among others.

Totti Könnölä, MSc in Environmental Economics, is a Doctoral Student at the Systems Analysis Laboratory at Helsinki University of Technology and an Expert in Gaia Group Oy, a Finnish consultancy specialising in energy, environmental and technology studies. His doctoral thesis deals with inter-organisational collaboration and participatory management of foresight processes. He was one of the coordinators of the foresight project described in this paper.

Mari Hjelt, DTech, is an expert in strategic policy issues in the fields of technology policy, transport and sustainable development. She is the Leader of the technology and risk analysis business areas in Gaia Group Oy, a Finnish consultancy. In her research, she focuses on decision support methods and has extensive knowledge of quantitative modelling tools. She was the Project Manager of the foresight study described in this paper.

1 Introduction

In recent years, national, regional and sectoral foresight studies have been conducted in many countries, in order to define research priorities and to look at the future from a broad range of complementary viewpoints (Hjelt et al., 2001). The locus of foresight activities has tended to shift from positivist and rationalist technology-focused approaches towards the recognition of broader concerns that encompass the entire innovation system, including its societal dimensions (Caracostas and Muldur, 1998; Gavigan, 2002; Hjelt et al., 2001; Schomberg, 2002). In parallel with this development, increasing attention has been paid to effective communication and extensive stakeholder participation, for example, the High Level Expert Group appointed by the European Commission crystallised these trends by defining foresight as follows (European Commission, 2002):

> "A systematic, participatory, future intelligence gathering and medium-to-long-term vision-building process aimed at present-day decisions and mobilising joint action."

One of the strengths of foresight stems from its ability to balance analytic (i.e. production of factual future-orientated statements) and communicative (i.e. catalysis of dialogue processes among the stakeholders) approaches in relation to its stated objectives. Yet, the selection of these approaches and ensuing methodological choices is not an easy task, given that the different methods (e.g. Delphi-survey, critical technologies, expert panels, see, e.g. Porter et al., 1991) have their specific advantages and disadvantages:

- The Delphi method (Helmer, 1983; Cuhls et al., 2002), for example, gives those in charge of the foresight process rigorous methodological control, thus ensuring that the process does produce a wealth of judgmental statements on the scientific, technological and other relevant developments. But unless the results are deliberately subjected to an ensuing debate, interactions among the stakeholders may remain relatively weak. Without such interactions, it may be difficult to translate factual results into corresponding actions, or to commit stakeholders to the implementation thereof (see, e.g. van der Meulen et al., 2003).

- Loosely controlled expert panels, on the other hand, allow the panel members to engage in intensive deliberation processes (see, e.g. Havas, 2003; Keenan, 2003). Without adequate methodological support, however, panels may encounter difficulties in producing concrete and comparable results ('deliverables'). Also, enhanced communication occurs mostly *within* the panels which may be at worst time-consuming, expensive and inefficient in promoting innovativeness and producing concrete outcomes (Eerola and Holst-Jörgensen, 2002; Hjelt et al., 2001).

Given the broad range of issues addressed by most foresight exercises, one of the defining features of foresight is the creative generation of synthetic knowledge, whereby future-orientated expectations are jointly produced, combined and assimilated by soliciting inputs from participants for critical reflection. By construction, such a process of mutual learning and knowledge production aspires to be a creative one, as the very *raison d'être* of foresight is its ability to provoke changes in how the participants view their individual and collective futures. These changes are not some formal output that is produced at the end of the exercise: rather, they emerge gradually in the course of the process. Most notably, such changes may be concerned with – or even invalidate – the role and objectives that were initially ascribed to the foresight exercise.

The above observation has two important ramifications for the management of foresight exercises. Firstly, if foresight is regarded as a creative process which helps evaluate its *own* role in an evolving innovation environment, it may be impertinent to fix foresight objectives for the duration of the entire exercise – if only because the foresight exercise produces information on the relevance and attainability of these very objectives. Secondly, instead of seeking to 'fix' the objectives and associated process design at the outset, those in charge of the foresight process should anticipate and even prepare for later modifications in the implementation plan. Interestingly enough, the foresight literature contains several accounts of the tensions arising from attempts to map out and execute large-scale foresight exercises according to a clear 'blueprint' (see, e.g. Cuhls, 2003; Havas, 2003).

In this setting, we argue that *responsiveness* to shifting objectives and stakeholder expectations should be regarded as a major concern and even a key design variable in the planning and execution of foresight activities. The need for responsiveness – by which we mean *purposely designed managerial controls for making warranted mid-course adaptations to foresight objectives and implementation plans* – depends on the envisaged role that is ascribed to a specific foresight activity in an evolving innovation environment. Motivated by a recent foresight study for the Finnish food and drink industries, we therefore discuss three overarching objectives of foresight activity and analyse different manifestations of responsiveness. We also typify different kinds of foresight activities and derive implications for the execution of foresight studies and other instruments of strategic policy intelligence.

The remainder of this paper is organised as follows. Section 2 elaborates the notion of responsiveness in relation to three general objectives that are commonly associated with foresight exercises. Section 3 considers manifestations of responsiveness in a foresight study that was recently carried out for the Finnish food and drink industries. Section 4 concludes the paper.

2 Foresight objectives

Each foresight exercise is a unique endeavour, enacted in a specific context characterised by its clients, stakeholders and objectives. In search for commonalities and the general rationale of (technology) foresights, Barré (2002) emphasises three general objectives:

- science and technology priority setting
- developing the connectivity and efficiency of innovation system
- creating shared awareness of future technologies.

Van der Meulen et al. (2003) outline a framework for evaluating a major foresight exercise for the Dutch agricultural sector, whereby they differentiate between impacts that pertain to

- envisioning the future
- organising interaction
- promoting commitments to actions.

They stress that the systematic exploration of the future dynamics of science, technology, economy and society, as well as intensive interaction among the relevant stakeholders, are prerequisites for the generation of valid action plans to which the stakeholders can commit themselves. At a conceptual level, Salmenkaita and Salo (2002) observe that because the generation and assimilation of future-orientated information may entail high costs, innovation systems may suffer from 'anticipatory myopia', which warrants government interventions in the form of publicly sponsored foresight exercises.

While the specific objectives vary from one foresight exercise to another, it is nevertheless helpful to outline overarching objectives that are applicable to a broad range of foresight activities. Building on upon the work of Barré (2002) and van der Meulen et al. (2003), we therefore consider three interdependent objectives:

- improved systems understanding
- enhanced networking
- strengthened innovation activities.

2.1 Improved systems understanding

In their systemic theories of innovation, researchers such as Edquist (1997) and Lundvall (1992) stress the need for a structural understanding of sub-systems, noting that innovations emerge through a co-evolution of scientific, technological and societal subsystems. Apart from the performance of individual sub-systems, the innovative performance of an economy depends on their mutual tuning (Freeman and Soete, 1997; Smits and Kuhlmann, 2002) and, specifically, on "how [these sub-systems] interact with each other as elements of a collective system of knowledge creation and use, and on their interplay with social institutions" (Smith, 1996). Furthermore,

innovation systems exhibit a 'memory' or path-dependency (Rosenberg, 1976), as institutional strengths and weaknesses, too, tend to evolve according to a logic which is specific to each society (Hollingsworth and Boyer, 1997).

Here, one of the objectives that can be ascribed to foresight is that of helping the stakeholders share, synthesise and assimilate information about the innovation system at large, thus allowing them to arrive at an improved understanding of the (external) context within which innovations are created and taken into use. Such an understanding exhibits several dimensions, ranging from an awareness of the *structural* properties of and interrelationships among the relevant institutional subsystems, to a recognition of the *dynamic processes* which govern innovation processes, including the interplay of social institutions (e.g. values, norms, legal frameworks). This kind of understanding helps the stakeholders position themselves in the innovation system, allowing them to take informed decisions when forging collaborative links to other parts of the system, for example. It also helps consolidate a shared informational basis that supports the development of joint action plans.

2.2 Enhanced networking

Because much of the knowledge about the innovation system is scattered among different stakeholders, enhanced networking may be needed to bring in inputs from different fields of expertise for the development of a systemic vision of the innovation system, to counter the possibility that ensuing activities are fragmented or even counterproductive (Tübke et al., 2001). In order to pave way for these efforts, foresight activities need to promote enhanced networking among the stakeholders, for instance by catalysing personal contacts that did not exist before, or by deepening the qualities of previously established contacts.

Thus, by analogy to Barré's (2002) typology of foresight studies, developments in networking can be analysed in terms of *extensiveness* (e.g. which stakeholders are placed into contact with each other in the different phases of the foresight exercise, in one way or another?) and *intensiveness* (e.g. how intensely are these contacts enacted in terms of information exchanges and collaboration?). Here, three levels of stakeholder engagement with respective objectives can be distinguished:

1 *Low engagement*: stakeholders exchange ideas and perceptions on future challenges and comment on foresight deliverables, thus contributing inputs to the exercise which, however, does not necessarily lead to notable changes in their perceptions.

2 *Medium engagement*: stakeholders engage in collaborative learning processes and proactive development of innovative options, to the effect that the perceptions of individual stakeholders are shaped by these processes (which, however, do not necessarily lead to the adoption of joint action plans).

3 *High engagement*: stakeholders are intensively involved in the collaborative management of the foresight exercise and also assume responsibilities in contributing to the development and realisation of jointly approved actions plans.

High engagement requires continuous and transparent processes of learning and trust-building (Cruickshank and Susskind, 1987; Moore, 1996). Such processes,

however, may become time-consuming and expensive if the number of participants who serve on panels increases (Hjelt et al., 2001; van der Meulen et al., 2003); but without a sufficient number of participating stakeholders the activity may fail to reach sufficient media attention, or difficulties may be encountered during the uptake of results.

2.3 Strengthened innovation activities

Most foresight exercises seek to promote innovative actions, for instance by generating ideas about prospective innovations, or by outlining policy measures that are expected to improve the innovation environment. The third objective – called *strengthened innovation activities* – therefore comprises the development, selection and implementation of recommendations that contribute to the innovative performance of individuals, organisations or the innovation system at large. Broadly seen, it also refers to improvements in the participants' ability to harness creative and analytical approaches in their innovation processes (e.g. the deployment of decision analytic methodologies, use of science fiction as a source of thought-provoking examples; see, e.g. Porter et al., 1991).

In complex innovation networks with weakly aligned stakeholder interests, the attainment of this objective calls for the open recognition of the stakeholders' interests (e.g. user perspectives; Smits, 2002). This can be facilitated by promoting creative learning activities among the participants, for example, by encouraging them to share ideas, interests and expectations. Here, concrete processual tasks to this effect include (e.g. Higgins, 1994):

- the separation of the creation of alternatives from that of their evaluation
- the provision of possibilities for anonymous feedback
- the provision of ample time for reflection and information processing
- the acknowledgement of the plurality of values.

On the other hand, it may be advantageous not to emphasise consensus seeking: for example, the search for consensual agreements in foresight studies have occasionally led to excessive generality and even the lack of innovativeness (Luoma, 2001).

2.4 Interrelationships among the objectives

The above three objectives are by no means independent but closely intertwined. For example, enhanced networking is often a prerequisite for the development of an improved systems understanding, while strengthened innovation activities build on enhanced networking (e.g. formation of collaborative networks within which innovations are developed) and improved systems understanding (e.g. awareness of the framework conditions which impact innovation processes). Arguably, strengthened innovation activities is the most fundamental of the three, in that the two other objectives underpin the generation of innovative ideas and the development of policy measures. In the same vein, one may argue that some of the well-known 'C's (i.e. concentration on the longer-term, coordination, consensus, communication, commitment; Martin and Irvine, 1989) are subordinate to others:

i.e. extensive communication and concentration on the future may be needed to reach a consensus, which in turn helps stakeholders commit themselves to coordinated actions.

While the earlier foresight literature has emphasised priority-setting – which in the above framework is one of the ways of developing recommendations towards strengthened innovation activities – more recent accounts have stressed processual considerations in relation to enhanced networking (see, e.g. Irvine and Martin, 1984; Salo and Cuhls, 2003). This parallels the realisation that the success of innovative activities depends on the decisions that are taken within the *local* context and the characteristics of the surrounding innovation environment (Smits and Kuhlmann, 2004), and not only on high-level allocative decisions.

In particular, because the local context and the innovation environment are shaped through collaboration, it follows that considerable attention needs to be paid to process considerations. Such an emphasis is also aligned with the notion that foresight should be a *creative* exercise where the formal deliverables are not fully specified at the outset, but emerge from new constellations and interactions among the participants.

3 Responsiveness in foresight management

Several accounts have stressed that foresight activities are fundamentally learning processes (Geourghiou and Keenan, 2000; Havas, 2003; Hjelt, 2001; van der Meulen et al., 2003), in the course of which policy makers and other participants learn from each other, allowing them to come to a more informed understanding of the innovation system. This learning process, however, may lead them to the realisation that the initial foresight objectives and corresponding methodological choices are no longer appropriate. For example, in the Hungarian foresight exercise (Havas, 2003), objectives and methods were discussed during several successive rounds, to the effect that continuous adaptation became a salient feature of the exercise. In the Swedish foresight project, too, the need for several milestones was stressed, in order to provide guidance to the project through interim evaluations and discussions: in effect, it was argued that an iterative process – as opposed to strict adherence to a step-by-step project plan – would lead to a more thorough analysis and conclusions (Luoma, 2001).

In view of these empirical observations and our initial discussion, we postulate that *responsiveness* – which refers to purposely instituted managerial mechanisms for making warranted mid-course adaptations to foresight objectives and implementation plans – should be regarded as a relevant design variable in the management of foresight activities. In effect, responsiveness requires *receptivity* vis-à-vis the interests and expectations of participating stakeholders, achieved through openness in listening to the participants and also in recognising the incentives through which they are motivated (Salo, 2001): for example, if their expectations are not observed, the learning processes may remain one-sided, which in turn may cause difficulties in committing the stakeholders to eventual recommendations. Responsiveness also requires *flexibility* in planning and implementation, achieved through the ability to envision and execute even radical changes in the foresight process. In broad terms,

receptivity thus corresponds to the ability to solicit sufficient information on the viability of current objectives and implementation plans, while flexibility is achieved through the generation of new options and associated decision-making activities.

Typically, foresight methods – just like other research methods – gain their rigour through control, standardisation and objectivity rather than through the adoption of responsive or flexible approaches. This notwithstanding, responsiveness need not contradict with methodological rigour: for example, the action research paradigm – which subsumes a variety of methodologies such as Checkland's soft systems analysis (Checkland, 1981) and Argyris' action science (Argyris et al., 1985) – implicitly acknowledges that responsiveness is a viable research strategy: indeed, through its parallel pursuit of action *and* research, action research relies on an iterative process to support improvements with regard to both of these dimensions. Here, action can be equated with the collaborative social processes in support of enhanced networking and the implementation of recommendations, while the role of research is to produce justifiable and well-grounded statements in support of improved systems understanding. When seen against the backdrop of action research – which is inherently cyclic, participatory, qualitative and reflective – responsive foresight activities constitute an iterative, collaborative and action-orientated learning process.

Responsive management of foresight activities has major implications for the specification of foresight objectives, design of management structures, adoption of methodologies and the roles of stakeholders:

- At the outset, it may be inappropriate to 'fix' foresight objectives in excessive detail, because the early phases of the foresight activity are likely to cast light on the relevance of these objectives. In particular, means objectives (which state how the fundamental objectives are to be attained; see, e.g. Clemen, 1996) should not be fixed prematurely, as new options of reaching these fundamental objectives may become available later on. On the other hand, it may be useful to promote the desired impacts of the foresight exercise (e.g. enhanced networking), because these are usually relatively stable and useful for motivational purposes as well, given that potential participants are more interested in these eventual impacts rather than the details of execution plans.
- Management structures must be designed in view of the possibility that adjustments to objectives and methodological choices will have to be made. Those who serve on decision-making bodies (e.g. steering groups) must be prepared for this possibility at the outset, meaning that meetings have to be held often enough, and the project managers involve such bodies into a reflective dialogue on what has been achieved during the different phases and what these achievements mean for the later execution of the project.
- Changes may be called for in the initial plans about concerning which stakeholders are invited to participate, in what capacity and for how long. This may pose challenges for external communication: for example, if it turns out that some invited participants are less productive and cooperative than initially envisaged, the exercise as a whole might benefit if they are replaced by other participants; yet it may be difficult to do so, without offending the former or increasing the total number of participants, which may lead to cost overruns.

- From the viewpoint of sponsors, it may be difficult to evaluate responsive proposals, because such proposals are characterised by the promise that the objectives will be reached by re-defining the scope, objectives and implementation plan in due time (instead of giving a clear blueprint of how, specifically, the project will be organised). Consequently, the emphasis in the evaluation of proposals may shift from an *ex ante* evaluation of the implementation plan to a closer scrutiny of the planned decision-making structures and processes, as well as an examination of the track record of the proposing organisations in stakeholder management. The sponsors may also insist on the definition of check-points at which the foresight process is formally reviewed before further budgetary commitments are made, or the development of risk management plans that are updated throughout the process.

- The responsible coordinators of the foresight process – and its project manager, in particular – need excellent skills in the recognition, communication and resolution of conflicting stakeholder expectations. In particular, they need to prioritise and translate such expectations into immediate action plans, as well as tentative action plans for later implementation. Here, it may be useful to produce intermediate deliverables for promoting a critical yet realistic debate on how the remainder of the exercise should be shaped. Instead of a single promise at the outset (which is approved by the sponsors), the project manager will have to make a sequence of promises on the achievement of which his or her professional credibility rests. Therefore skills in catalysing productive negotiations are vital, as well as in-depth expertise on what the various methodological options are likely to deliver in specific settings.

- From the viewpoint of external communication, responsiveness in foresight management may be problematic as the exercise may appear confusing (and hence unappealing) unless it is characterised by a sufficient degree of stability, at least in terms of its stated impacts. As a result, such communication should emphasise the intended role of the exercise within the innovation system, as well as the dissemination of intermediate deliverables, rather than the exposition of specific plans through which the exercise will be carried out (which, by design, may be subject to change).

In summary, key concerns in the responsive management of foresight activities include

- the frequency at which possible changes to the preliminary plans will be made

- the decision-making processes which are involved in the analysis and endorsement of possible changes

- the extensive communication processes which need to be put in place, to ensure that the responsive approach still appears professional and well-managed.

These concerns are closely intertwined: for example, if the decision-making bodies and their roles are not clearly defined, it may be difficult to communicate how the exercise is run. This, in turn, may leave outside stakeholders with the impression that it is haphazard or even chaotic.

It is of interest to note that, on occasion, influential industrial foresight-orientated processes have evolved through iterative cycles that were initially only loosely planned. For example, in the development of new technologies for wireless telecommunication, the participating firms of the Wireless World Research Forum produced competing visions of the future, which were then pitched against each other in terms of their societal ramifications and technological viability, with the aim of deriving implications for further collaborative research towards the realisation of new wireless solutions (Salmenkaita and Salo, 2004). This process was inherently a competitive and adaptive one, characterised by a lack of adherence to fixed methodological or processual frameworks.

Building on the above discussion, we offer a typology of foresight activities which extends from 'fixed' exercises, characterised by an initial approval of the 'problem' and associated methodological approaches (e.g. the Delphi method), to the use of autonomous panels which are given the freedom to address any issues that they deem relevant, through means of informal social interaction (see Table 1). Here, responsive foresight can be seen as an attempt to balance the benefits of fixed and autonomous foresight activities, as it draws upon the methodological arsenal of policy analysis (e.g. the Delphi method) but still recognises the relevance of communicative approaches, as elaborated by critical social theorists (see, e.g. Habermas, 1997) in the re-shaping of objectives. By doing so, responsiveness may fulfil a dual role in mitigating risks:

- Although a fixed problem definition tends to produce 'exact' answers (e.g. Delphi predictions), it may turn out that this 'problem' was not very relevant, in view of the other problems that were recognised later on in the process.
- Autonomously working expert panels may produce deliverables that are difficult to contrast, or contain conflicting assumptions or recommendations. The panels may also come to an impasse if the members have irreconcilable conflicts or do not have access to analytically grounded inputs (Geourghiou and Keenan, 2000; Havas, 2003; Vader, 2001).

In this setting, the defining feature of responsiveness is that the coordinators collaborate with the different stakeholders, in order to implement foresight cycles which, by design, contribute to improved systems understanding, enhanced networking and strengthened innovation activities.

Table 1 Dimensions of three archetypal foresight approaches

Dimensions	*Foresight approaches*		
	Fixed	*Responsive*	*Autonomous*
Philosophical premises	Natural sciences, decision and policy analysis: reality is measurable, fragmental, value free	Decision and policy analysis in combination with critical social theories: reality is many-faceted, socially constructed, holistic, value bounded	Critical social theories: reality is perceived through values of equity and social processes
Systems view	Hard systems, mechanic, classical physics	Semi-hard systems, complex structures and processes influenced by values and purposeful organisations	Soft systems, social processes
Management approach	Centralised	Intermediated by process coordinators	Delegation of managerial responsibilities
Process design	Coordinators fix the scope and methods of the exercise at the outset and control the process Approved by sponsors at the outset	Coordinators and key stakeholders define the scope and used methods in an iterative, cyclic and reflective learning process	Coordinators facilitate autonomous and evolving participant-led continuum of meetings
Process focus	Deductive technical validation, refinement of factual statements	Collaborative learning, innovative vision building, deductive and inductive	Creative synthesis, consensus, inductive and deductive
Methods	Delphi, structured questionnaires and interviews, multiattribute decision models	Panel workshops, facilitated social interaction, semi-structured questionnaires and interviews, problem structuring methods, decision analysis	Panel workshops, informal social interaction
Basis of implementation of results	Authority	Common visions, commitment to jointly produced action plans	Stakeholder consensus

4 A foresight study for the Finnish food industry

In the Summer of 2001, the National Technology Agency (Tekes) and the Finnish Food and Drink Industries' Federation (the Federation, for brevity)[1] decided to sponsor a two-pronged project that aimed to evaluate Finnish research activities in food and drink industries to foresee the future technology needs in these industries up until 2015. Accordingly, the project coordinators[2] suggested that the project be divided into two parts: the evaluation of Tekes technology programmes[3] and the implementation of the technology foresight process. Although these parts were separately executed, there were close synergies between them, as the evaluation provided background material for the foresight process. In total, the two parts were conducted over a period of about one year. The foresight process was coordinated by the authors.

In what follows, we focus on the foresight process which involved some 130 experts from industrial firms, research organisations and public agencies. The main objectives of this process were:

- improved understanding of the whole innovation system of the food sector in Finland, including interactions between industry, science and technology systems
- innovative and comprehensive outcomes including priority-setting and the development of recommendations for further actions
- commitment of key stakeholders to such outcomes
- strengthening and creating new intra- and inter-sectoral collaboration.

These objectives were to be met within a strict implementation budget, making it necessary to search for cost-efficiency in process management and design. This notwithstanding, the initial objectives were loose enough that they allowed for a responsive foresight design.

4.1 Context and process

The project was strongly supported by a steering group (SG) which was organised around the Research and Education section of the Federation and Tekes' representatives who invited further representatives from selected research institutes. The SG followed the whole process and took decisions concerning the implementation of the foresight project. The process evolved through a continuum of iterative and reflective cycles as outlined in the project proposal (see Table 2). These cycles were relatively loose at the outset; but details on each new cycle were designed together with the SG, based on the results of the earlier cycles. The key element ensuring the responsiveness of the exercise was indeed this stepwise redefinition of the exercise as it proceeded. Overall, the foresight exercise consisted of two main phases. First, there was an explorative phase in which future challenges were defined and focal areas were selected (Cycles 1–3). Second, these focal areas were then subjected to in-depth analyses (Cycles 4–6).

Table 2 Iterative cycles of the foresight process

Cycles process	*Months (I–XV)*	*Main activities*	*Participants*
Cycle 1. Preparations for the project	▮	Negotiations	Coordinators, Tekes & the Federation
Cycle 2. Contextual mapping (trends, challenges)	▮▮▮▮▮	Literature review, 59 semi-structured interviews, questionnaires	Leading experts in research organisations, governmental agencies and companies
Cycle 3. Selection of focal areas	▮▮▮	Workshop	Key stakeholders (SG, invited experts)
Cycle 4. Analyses of focal areas	▮▮▮▮▮	Meetings, background material, internet questionnaire, workshops, mid-term reports	Experts in the food and in the supporting sectors (e.g. ICT, packaging, logistics, consumer research)
Cycle 5. Synthesis of results, derivation of implications	▮▮▮▮▮▮▮▮▮▮	Meetings Compilation of reports	Coordinators and steering group
Cycle 6. Dissemination of the results	▮▮▮▮▮▮▮▮▮▮	Conference presentations, dissemination of final report and articles, press conference, meetings	All stakeholders

4.1.1 Explorative phase

Based on the literature review, the coordinators developed a framework on research, industry and technology systems and semi-structured interview protocols and surveys for the expert interviews, with the aim of mapping societal and technological challenges. The initial interviews during the first months of the project served two purposes, as they helped gather anonymous opinions from key stakeholders and informed them of the ongoing process, which increased their interest in it. After the interviews, the coordinators initially identified nine potential areas of future challenges. The SG members, together with other key stakeholders, attended a one-day workshop where computer-assisted rating exercises and brainstorming discussions were carried out to elaborate and redefine and restructure these focal areas. Through this process, the attention of the project was eventually directed to six focal areas with a somewhat sharper focus:

- consumer needs and new technologies
- development of technological expertise in small companies
- efficiency of information management in the food value chain
- new business opportunities related to health and functional food
- purity and food safety
- commercialisation of research innovations.

4.1.2 In-depth analyses of focal areas

Each focal area was addressed in a one-day workshop (WS). These workshops were attended by 8–12 participants, and they were organised according to the following principles:

- *Supporting expert groups* (SEG) – which consisted of 2–4 experts and a coordinator – were appointed for each WS. These groups helped coordinators collect relevant material, define the WS scope, identify persons to be invited, and validate the supporting background material for each WS.
- An extensive *workshop report* was sent to the participants before each WS. This report was revised based on the WS results and then disseminated as a mid-term deliverable to a wider audience. Shorter versions of these reports were contained in the final project report.
- Before the workshop, the participants were invited to fill in *an internet questionnaire* which provided information on the participants' expectations and also allowed them to raise issues for the WS agenda.
- With minor variations, all the WSs had the same structure which consisted of:
  - an introductory session (round-table introduction, presentations of background material, results from the internet questionnaire)
  - creative explorative discussion of new ideas
  - prioritisation of discussion items
  - evaluation and elaboration of items in smaller sub-groups (2–4 persons)
  - concluding session.

The SEGs were crucial in supporting the in-depth analyses. On the average, these groups met twice before the workshop and engaged in e-mail discussions, too. Even though they consisted largely of experts in the focal area, knowledgeable people with different viewpoints and backgrounds were deliberately invited: for example, the SEG of the focal area 'Consumer needs and future technologies' included an expert on mobile communication, as well as a researcher in the field of functional food. Typically, one SEG member was also a member of the SG, which established an important link of information transfer between the WSs and the whole exercise.

Although the SEGs were given a mandate to support the coordinators in designing the WSs, they did not have formal decision-making power: for instance, the coordinators had the final responsibility to nominate the WS participants and to

define the content and the methods of each workshop. This reduced the work load of the SEGs and provided more room for creative discussions and diverging viewpoints within the SEGs. Also, the status of SEGs as stakeholders and clients helped ensure that the coordinators remained responsive (but not subordinated) to the ideas presented.

The number of participants in each WS was kept relatively small (i.e. at most a dozen people), therefore they all had opportunities for making active contributions. In the selection of participants, the aim was to bring in representatives from different industrial sectors and fields of research (e.g. telecommunication) into creative learning sessions where most participants would not know each other beforehand. This combination of two objectives – i.e. a small number of people and a variety of backgrounds – was not always easy to reach: in fact, the extensive marketing through the initial interviews and the work of the SEGs created a situation where more people expressed their interest in attending the WSs than could be accommodated, in view of space limitations. The resulting tensions were partly resolved by giving all interested parties opportunities to comment on mid-term reports.

The WS design included several responsive steps. The content of each WS was influenced by SEGs on which the viewpoints of different stakeholders were represented. The fact that most WS participants did not know each other in advance entailed challenges (e.g. lack of common terminology) which were addressed though an internet questionnaire, flexible WS execution and interim reporting. That is, before the workshop, the WS participants were requested to study the WS draft and to fill in an internet questionnaire through which they could supply anonymous comments and raise focal topics for discussion. Based on these responses, the detailed content of each WS was then refined. Because the questionnaire referred extensively to the draft report, the participants were encouraged to read the report, which in turn helped them adopt 'a common language' from the very beginning.

4.1.3 Combining results and foresight implications

Interlinkages between cycles – particularly between different WSs – made it easier for the coordinators and the SG to compile the main findings and to produce recommendations for the development of the Finnish food-related innovation system. Here, frequent SG meetings and extensive reporting activities were vital: for example, each WS report was reviewed four times – first by the respective SEG, then twice by the WS participants, and finally a wider audience to whom the final revision was sent out for comments. This was time-consuming but made it easier to pull together the main conclusions. The circulation of interim reports also served as a link between the different WSs, as many issues were relevant to more than one WS. The WS reports also had a life of their own, in that some stakeholders sent them to unexpected audiences via e-mail.

Responsiveness vis-à-vis the media and the broader innovation environment was achieved by disseminating press releases and preliminary WS reports during the project. Conference presentations were held in order to engage a wider group of stakeholders, with the aim of catalyse open-ended discussions (as opposed to the delivery of final 'results'). In consequence, the foresight process attracted considerable media attention, including publicity through radio broadcasts and articles in newspapers and professional magazines.

4.2 Relationships to foresight objectives

The design of the foresight project had several relationships to the three foresight objectives discussed above, as suggested by the following observations, among others:

- *Improved systems understanding*: the iterative process was useful in producing increasingly detailed descriptions of three sub-systems of the innovation system (i.e. industrial system, research system, technology systems), whereby the emphasis shifted from the traditional value-chain approach towards a richer network model of interacting research groups and industrial firms (i.e. no early commitments were made as to how these sub-systems would be presented). Moreover, cross-cutting themes raised in the sequentially produced WS reports were addressed from a variety of systemic viewpoints, including comparative analysis with other sectors of the innovation system.
- *Enhanced networking*: in the selection of WS participants, the SEGs sought to invite people from different backgrounds and mindsets (i.e. creation of 'new linkages', extensiveness), while the high engagement of WS and SEG members contributed to intensiveness. Responsiveness was pursued by postponing the selection of WS participants up to the point where there was a relatively clear understanding of what the objectives of each workshop were.
- *Strengthened innovation activities*: the iterative development and extensive dissemination of intermediate results (e.g. WS reports) were useful from the viewpoint of validation, which made it easier to formulate recommendations that could be approved by the SG. In the workshops, tools in support of the creative generation of ideas were deployed, with the aim of encouraging the participants to adopt similar practices in their own organisations. Minor methodological adaptations were made in the later WSs, based on experiences from earlier ones.

5 Conclusions

Although autonomous approaches – such as independently working expert panels – are often relied on for the execution of foresight activities, such panels may encounter difficulties in producing actionable and comparable results. Conversely, the early adoption of rigorous methodologies may entail risks in that the initial questions may turn out to be of lesser relevance as the foresight process moves on. In this context, we have argued that responsiveness is a relevant design variable in the management of foresight processes, and that responsiveness may help address the many uncertainties that are inherent to a creative exercise such as foresight. In addition, we have exemplified some dimensions of responsiveness by reporting a recent foresight process for the Finnish food and drink industries.

Over the past decades, the emphasis of foresight activities has shifted from attempts at priority-setting towards more participatory approaches which accommodate a broad range of scientific, technological and societal concerns, with the aim of catalysing interactive learning processes among the stakeholders. These broader concerns are increasingly important for the development of systemic

instruments of innovation policy (see, e.g. Smits and Kuhlmann, 2004), yet the proper recognition thereof implies major challenges in terms of high uncertainties, incremental generation of synthetic information and choices among focal topics. Thus, it seems that the management of systemic instruments should be able to react to changing requirements, much in the same way as a responsive foresight process may benefit from mid-course re-adjustments. This suggests that responsiveness – which we have examined in relation to foresight only – is also highly relevant to the management of other instruments of innovation policy.

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Notes

[1] The Finnish Food and Drink Industries' Federation (FFDIF) represents and promotes the interests of Finnish food and drink industries. In this project, it served as an important link to the industry (http://www.etl.fi).

[2] The project was coordinated by a team of experts from a consulting company, Gaia Group Ltd (http://www.gaia.fi) and the Systems Analysis Laboratory at the Helsinki University of Technology (http://www.sal.hut.fi).

[3] Tekes organised the first Innovation in Foods technology programme (1997–2000) and has started the second Innovation in Foods programme (2001–2004).