Technology Analysis & Strategic Management

Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/ctas20

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Published online: 12 Oct 2009.

To cite this article: Ahti Salo , Ville Brummer & Totti Könnölä (2009) Axes of balance in foresight - reflections from FinnSight 2015 , Technology Analysis & Strategic Management, 21:8, 987-1001, DOI: 10.1080/09537320903262447

To link to this article: http://dx.doi.org/10.1080/09537320903262447

Technology Analysis & Strategic Management
Vol. 21, No. 8, November 2009, 987–1001

Axes of balance in foresight – reflections from FinnSight 2015[1]

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In 2005, the Finnish Government took a decision in principle on the structural development of the public research system. This decision spurred the two main funding agencies – the Academy of Finland and the Finnish Funding Agency for Technology and Innovation (Tekes) – to carry out *FinnSight 2015*, a joint foresight exercise that would provide inputs to this strategy, foster collaboration between these funding agencies and promote foresight and innovation activities at large. Towards these objectives, FinnSight 2015 engaged 10 expert panels which identified key driving forces and characterised focus areas of competences by making extensive use of Internet-based tools and by engaging in intensive deliberations at facilitated workshops. We also describe the policy context and methodological support of FinnSight: specifically, we report how challenges arising from the tight schedule were addressed through the process design and what policy developments have taken place after to the publication of foresight results, in the belief that our analysis may be instructive for the planning of large-scale foresight exercises that need to serve high-level policy objectives subject to demanding time constraints and expectations.

Keywords: foresight; research and innovation policy; innovation studies; group decision support

1. Introduction

As an instrument of strategic policy intelligence (Smits and Kuhlmann 2004), foresight must often serve multiple objectives that are shaped by its policy context. Typically, these objectives include attempts (1) to prepare priorities in the research and innovation (R&I) system, (2) to reorient the R&I system, (3) to demonstrate the vitality of this system, (4) to bring new actors to R&I debates, or (5) to foster new networks (Georghiou and Keenan 2006). Ultimately, many of these objectives seek to strengthen the efficacy of innovation activities, for instance by improving the stakeholders' understanding of the R&I system or by fostering collaboration processes within innovation networks (cf. Eriksson and Weber 2008; Hekkert et al. 2007; Salo, Könnölä, and Hjelt 2004).

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ISSN 0953-7325 print/ISSN 1465-3990 online

DOI: 10.1080/09537320903262447
http://www.informaworld.com

In effect, the extent to which the objectives of a foresight exercise are instrumental (e.g. priority-setting) or informational (e.g. awareness-raising) has implications for planning decisions that include, among others, choices about how many stakeholder groups will be consulted; whether the full diversity of their perspectives will be retained in the final results; and how strictly the participants must adhere to the use of proposed methodologies in their work. In this setting, the chances of conducting a successful foresight exercise can be much enhanced if these questions are explicitly recognised in the pre-foresight phases (see, e.g. Irvine and Martin 1984; Martin and Irvine 1989; Rask 2008) with the aim of aligning the methodological design of the exercise with the explicit and even implicit objectives that are placed on the exercise.

In this paper, we describe *FinnSight 2015* (henceforth FinnSight for brevity), the national foresight exercise of the *Academy of Finland* and the *Finnish Funding Agency for Technology and Innovation* (*Tekes*), which served to inform – albeit indirectly – the development of the national strategy and the attendant implementation of several Strategic Centres of Excellence in Science and Technology. In our analysis, we discuss the policy context, management structure, methodological execution and key results of FinnSight. We also report some subsequent policy developments and examine FinnSight in view of axes of balance that are arguably helpful in the planning of foresight exercises. The methodological novelties of FinnSight are highlighted, particularly as concerns the combination of distributed work by individual panellists and their interactive collaboration in groups.

The rest of this paper is organised as follows. Section 2 outlines the policy context of FinnSight. Section 3 describes the methodological design, execution and main results of FinnSight and reports subsequent policy developments in the R&I system. Section 4 examines FinnSight in view of four axes of balance and Section 5 concludes.

2. FinnSight in context

In comparison with many other countries, Finland has had an active and varied foresight scene, characterised by numerous activities that have been initiated by several key actors of the R&I system (see, e.g. Kaivo-oja, Marttinen, and Varelius 2002; Andersen et al. 2007). For example, the Ministry of Trade and Industry has facilitated a so-called Foresight Forum (Könnölä, Brummer, and Salo 2007); the Finnish Agency for Technology and Innovation (Tekes) has catalysed extensive consultation processes with researchers and industrialists in its strategy development (Salo and Salmenkaita 2002); and the Finnish Innovation Fund (Sitra) has sought to promote a constructive dialogue on impending societal challenges by establishing a so-called Future Forum. In addition to one-of-a-kind exercises, important elements of foresight activity are ingrained in policy processes at the highest level of decision making: for example, once during the electoral period, the Government produces a report on some salient aspects of the future of Finland. In the Parliament, this report is extensively debated by the Committee of the Future which produces a written response to it; both the Government's report and the Committee's response are then debated in a plenary session of the Parliament (see, e.g. Salo and Kuusi 2001).

Yet, these many activities notwithstanding (or possibly because of the proliferation thereof), there have been no foresight exercises on a scale that would match the scope and the level of ambition of large-scale national exercises elsewhere (for example, in Hungary, France, Germany and United Kingdom, see Havas 2003; Durand 2003; Cuhls 2003; Keenan 2003). This may have been because Finland is a small country: thus, some results from even seemingly isolated foresight activities can be brought to bear on policy making even in the absence of formal coordination,

because it is more likely that some experts participate in several such activities. Furthermore, the overall institutional and organisational structure (cf. Edquist 1997) of the Finnish innovation system has remained largely unchanged for some time. As a result, there has been less need for establishing national thematic priorities that would transcend the boundaries of individual organisations or go beyond the processes of thematic priority-setting that are carried out within specific S&T policy instruments such as research and technology programs (cf. Salo 2001; Salmenkaita and Salo 2002).

This situation changed in April 2005 when the Government took a decision in principle on the structural development of the public research system at large. In this decision, the Government emphasised that the research system is to be developed in its entirety, with the aim of improving the quality and relevance of research and development activities. The Government also noted that key measures towards this end will include the establishment of shared priorities, the strengthening of the national and international profile of research organisations, and the establishment of selective decision processes based on foresight. Furthermore, this decision obliged the Academy of Finland[2] and the Finnish Funding Agency for Technology and Innovation[3] (Tekes) to deepen their collaboration in the context of funding activities and other R&I instruments, with the aim of enhancing the impacts of public R&I funding and facilitating the formation of larger research units. Finally, the Decision stated that the Science and Technology Policy Council of Finland (STPC) should develop by the end June 2006 a national strategy for establishing Strategic Centres of Excellence in Research and Innovation.

In effect, the Government's decision ascribed new tasks to the Academy of Finland and Tekes. These two main funding agencies for basic and applied technological research (which had annual funding appropriation of some €297 million and €527 million in 2008, respectively) took the initiative to launch a joint foresight exercise that would provide informational inputs to the shaping of the national strategy and also other strategic planning processes. This exercise involved new challenges for the collaboration of these funding agencies, because they had not had engaged in joint consultative foresight activities except within specific research programs (see, e.g. Salo and Salmenkaita 2002). Yet, the very remit of the foresight exercise – for which the apt title *FinnSight 2015* was coined – implied that a large-scale consultative process was called for, to ensure that the exercise would tap the expertise of leading researchers and industrialists, and that its results would build on broad enough a basis to ensure credibility and legitimacy.

3. Process design and implementation

3.1. *Early preparations and management structures*

The initial preparations of FinnSight were started in early 2005 at a time when the Government's decision was known to be forthcoming. At this stage, Raimo Väyrynen, the President of the Academy of Finland, and Veli-Pekka Saarnivaara, the General Director of Tekes agreed that they would launch a joint foresight exercise and that the foresight deliberations would be carried out by expert panels, although neither the number of panels nor their thematic positioning were specified at this stage. The initial intent was followed by establishing a project organisation. The Steering Group consisted mostly of civil servants from the top management of the funding agencies and Väyrynen and Saarnivaara took turns in chairing its meetings. In addition, a so-called Core Group was appointed, with responsibility for the planning and methodological support of the exercise. It was assisted by the guidance that the Steering Group provided through its discussions and decisions on key matters (e.g. approval of project plans, definition of panel titles and appointment

of panel chairmen). The Core Group consisted of civil servants from both funding agencies, except for the first author of this article who served as its chairman and the project manager of FinnSight.

3.2. *Foresight panels and phases of the foresight process*

The delineation of foresight panels was an iterative process where the Core Group explored some alternative rationales for choosing panel titles, even in view of international experiences, and developed a tentative proposal that was debated by the Steering Group. After extensive discussions, the Steering Group chose to establish the following panels:

(1) Learning and learning society
(2) Services and service innovations
(3) Well-being and health
(4) Environment and energy
(5) Infrastructures and security
(6) Bio-expertise and bio-society
(7) Information and communications
(8) Understanding and human interaction
(9) Materials
(10) Global economy

Apart from its title, each panel was characterised by a description of about 150 words, exemplifying relevant scientific disciplines and associated technologies, as well as some domains of their potential application in industry and society. This notwithstanding, the panellists were explicitly encouraged to deliberate how they would construe the scope of their panels. The short panel descriptions merely conveyed impressions of potentially relevant themes, in the understanding that the panels would re-interpret and re-define these descriptions.

Two further aspects in the definition of panels are noteworthy:

- The tenth panel on Global economy was proposed by the Steering Group, further to the recognition that globalisation is a major determinant of the development of R&I systems. Apart from covering economic and some other sciences (as a topic of scientific inquiry in their own right), this panel was ascribed a horizontal role so that it supported the other panels by collecting statistical data on R&I systems and economic forecasts.
- The delineation of panels combined several complementary rationales. First, some panels (e.g. Information and communications) were partly driven by the comparatively strong global position of Finland, while others (e.g. Materials) were linked to rapid advances in generic sciences and their application. Second, a deliberate decision was taken *not* to establish panels based on traditional industry clusters (i.e. forest industries, construction), partly in view of earlier cluster-oriented studies: for if the panels had been defined based on such sector boundaries, the risk of arriving at 'conventional' results might have been greater. Third, some panels (e.g. Service and service innovations) had rather new and evocative titles. These panels were motivated by the growing importance of multi-faceted phenomena which, however, did not necessarily link to well-established fields of scientific inquiry or innovation activity.

Because FinnSight was a foresight process of *two* funding agencies with different but complementary roles in the R&I system, it was imperative to achieve a proper balance in addressing the

intertwined components of research (of key concern to the Academy of Finland) *and* innovation (of key concern to Tekes) in the R&I system. This, together with the large differences in the funding processes of these funding agencies,[4] implied that the external expert panels should have full autonomy in their future-oriented deliberations, and that they should be composed in a balanced manner. In addition to scientific fields and technological areas, even other dimensions of balance had to be addressed (e.g. gender issues, representation of geographical regions).

The balanced composition of the panels was ensured by appointing researchers and six industrialists onto each panel (whereby the Academy of Finland would propose the researchers and Tekes the industrialists). Towards this end, both funding agencies generated lists of prospective panellists who were approached by the Core Group after coordinating discussions. A further step towards ensuring the balance of panels was that each panel had two chairmen, one from academia and one from industry. The responsibilities for reporting the panel results were delegated to these two chairmen who, unlike other panellists, received a modest financial compensation for this duty.

The foresight process – which was designed by the Core Group and approved by the Steering Group – was based on panel-centric work where each panel would have three half-a-day meetings. In addition to the panel meetings, three additional meetings were held among the 12 panel chairmen with aim of enhancing the exploration of panel interfaces and ensuring that the panels would proceed in a sufficiently coordinated manner. These three meetings were held (i) before the first panel meetings where the chairmen met each other and resolved questions concerning the objectives of the exercise; (ii) after the second panel meeting where the panel chairmen presented early results to each other and discussed panel interfaces; and (iii) after the third meeting where they sought to identify synergies at these interfaces (see Figure 1).

Because of the tight schedule, the first panel meetings had to be organised soon after the panel chairmen had been appointed by the Steering Group. At this stage, the panel chairmen were invited to comment on the lists of prospective candidates that had been prepared by the Academy of Finland and Tekes. The chairmen were also invited to propose additional candidates; however, the decisions as to which candidates would be invited were taken by the Core Group. This made it possible to ensure that several dimensions of balance (including gender, regions, representation of scientific fields, technological areas, and industrial sectors) could be duly addressed.

It is noteworthy that the dates for the two initial panel meetings were fixed by the panel chairmen *before* the panellists were selected: thus, the panellists were appointed only on condition that (i) they were able and willing to contribute to FinnSight and (ii) they could attend the two initial meetings. Thanks to this latter requirement, the process could be started quickly so that the first

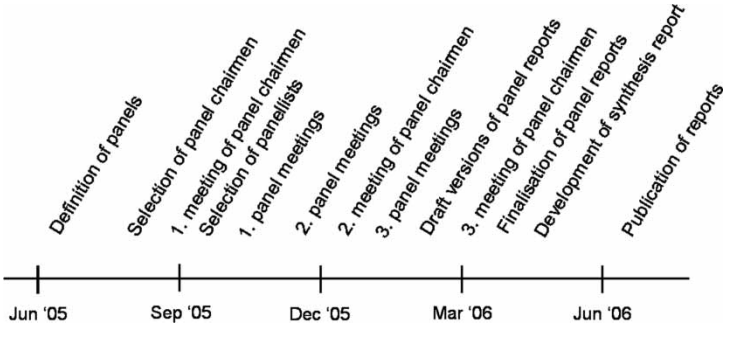

Figure 1. Schematic outline of the schedule of FinnSight 2015.

panel meetings were organised only about seven weeks later than the initial meeting of the panel chairmen.

3.3. *Analytical concepts and methodological support*

To support for the future-oriented deliberative process, units of analysis characterised by key concepts were defined to provide structure to the panel discussions and to assist in the exploration of future developments and their implications for scientific and technological competences. These concepts had to be sufficiently generic to serve the needs of all panels and to facilitate the development of meaningful priorities at an appropriate level of aggregation.

The following key concepts and templates were employed in FinnSight:

- *A driving force* was defined as an event or a development that could contribute to the realisation of changes with significant implications for future R&I activities. Apart from a brief descriptive title, each driving force was characterised with the help of a template containing a detailed description (what is the event or development about?) and separate analysis of its significance and impacts (why is this driving force relevant to R&I policy and R&I activities?). The driving forces were associated with three categories: to (1) major changes in the global context, (2) growing needs in Finnish industry and society, or (3) anticipated scientific and technological achievements.
- *A focus area of competence* was defined as a community of collaborating actors that (1) create or apply knowledge that is based on R&I activities and (2) and, by doing so, seek to respond to societal and industrial needs. Items in the template included questions on (i) what scientific fields and technological areas the focus area was linked to, (ii) what societal and industrial needs would be addressed by strengthening the focus area, (iii) what possibilities the focus area would offer for the concrete application of related knowledge, for instance by way of innovations, (iv) through what measures the development of the focus area could be best promoted.

(a) *Panel meetings*

To engage the panellists before the actual panel meetings, the panellists were requested to propose, comment, revise, and assess driving forces before and focus areas of competence through the internet before the panel meetings.

Specifically, about three weeks before the first panel meeting – the purpose of which was to address driving forces that would set the stage for the development of focus areas – each panellist was requested to propose through the internet three to five driving forces using the template. The resulting proposals were collated into a compilation document which was made available to the panellists. Using the 1-to-7 Likert scale, the panellists were invited again through the internet to assess (i) the probability of each driving force (i.e. how likely was it that the change would unfold as described?) and (ii) the significance of the factor (i.e. how significant was this driving force for future R&I activities?). Apart from their ratings, the panellists were also asked to provide verbal comments to justify their assessments.

In each panel, this prior consultation process resulted in a collated document that contained some 30–50 driving forces as well as numerical assessments and written comments on them. For each driving force, the full distribution of the assessment ratings was shown to convey information about the variability of perceptions among the panellists. This compilation document was circulated to the panellists about three days before the workshop.

In the first panel meetings, this compilation document served as a background document that helped set the stage for the meeting. Prior to these meetings, the Core Group encouraged the panel chairmen to pay particular attention to possible omissions and to examine possible interrelationships among the proposed driving forces. The meetings were facilitated by the two chairmen who had plenty of liberty in guiding the workshop discussions. In most panels, the discussions were captured by building MindMap® charts that provided, together with the compilation document, a written record that was useful for later reporting.

In the same vein, before the second panel meeting the panellists were requested to submit three to five proposals through the internet questionnaire for focus areas of competences using the template. The resulting proposals were then subjected to an internet-based assessment so that the other panellists could evaluate the focus areas with regard to (i) current level of expertise in Finland (i.e. how strong a basis do Finnish actors have in the development and applications of knowledge pertaining this focus area of competence?) and (ii) the future demand for this expertise (i.e. how strongly will the generation and of knowledge in this focus area of competence respond to the societal and industrial needs in 2015?). In addition, the panellists were requested to indicate their opinion of whether the focus area was among the most important third, the second most important third, or the least important third out of all the focus areas by the panellists. Practically all panels started the assessment phase of focus areas only after additional proposals had been generated further to the discussions at the second panel meeting.

The internet-based questionnaires before the workshop meetings offered many benefits. First, the panellists could contribute equally to the process and they could arrive at a shared understanding of what topics were seen as relevant by the panel as a whole. Second, the compilation documents were useful to the panel chairmen, because they could start the development of the panel reports from an extensive set of documentation, instead of having to merely recall discussions at past panel meetings. The documents also mitigated the risk that two chairmen would have exercised an unduly strong influence on the report contents. Third, the templates for driving forces and focus areas of competence helped ensure the attention would be to stay on topics that were aligned with the objectives of the exercise.

(b) *Management of panel interfaces*

The panellists had a considerable amount of freedom in interpreting the suggested scope of their panels. This, together with other reasons, made it necessary to pay attention to panel interfaces and especially to topics that would be seen as potentially relevant to several panels.

(1) The panels were purposely not oriented along the lines of industrial sectors or any other clear taxonomy. This meant that the examination of these sectors, for instance, called for the analysis of panel interfaces: for example, advances in relation to forest-related industries were discussed in panels on Environment and energy, Bio-expertise and bio-society, Materials, and Global economy, among others.
(2) Because FinnSight was a comprehensive exercise, it was necessary to ensure that no unintended omissions would arise due to possible misperceptions about what topics the other panels would cover.
(3) The importance of cross-disciplinary synergies in the development of path-breaking innovations suggested that explicit attention should be devoted to the opportunities offered by combinations of the focus areas that were deemed important by the different panels.

The coordination of panels was supported by three meetings for the panel chairmen. At the first of these meetings, the President of the Academy of Finland and the General Director of Tekes presented the objectives of FinnSight to the panel chairmen who could pose questions of clarification and also had a chance to meet each other. At the second chairman meeting – which was held after the second meeting of the panels – the panel chairmen presented tentative results from their panels to the other chairmen. At this meeting, some cross-cutting topics with connection to several panels were identified so that they could be explored further in the third panel meetings. The last meeting of the panel chairmen was held after the third panel meetings. At this one-day meeting, much of the attention was devoted to the synergies at the panel interfaces.

Also some other supported the exploration of panel interfaces. First, the modular process design ensured that the panels produced their analyses using the same concepts (cf. Brummer, Könnölä, and Salo 2008) which made it easier to compare results. Second, the questionnaires supported the consideration of interfaces in that the panellists were requested to specify which other panels their driving forces or focus areas were relevant to; these proposals were brought to the attention of the chairmen of these respective panels. Third, results from the internet surveys were made available to all panels which could thus monitor what topics the other panels were considering (even if these possibilities were not extensively harnessed).

(c) *Foresight outputs and their dissemination*

The responsibility for synthesising the panel reports was assigned to the panel chairmen. One reason for this was the desire to ensure that the panel chairmen would be fully responsible for the panel results. Moreover, the Core Group did not have enough editorial capabilities for assisting the panels, nor did its members have substantive knowledge about the full range of scientific and technical matters addressed in the panel reports. To assist the chairmen in enhancing the readability and consistency of panel reports, a professional journalist was hired in an editorial role to support of all panels.

Each panel produced a report of some 30–40 pages that focused on the driving forces and focus areas of competences that it deemed central for the development of the R&I system. In their reports, the panels were encouraged to examine a manageable number of topics (i.e. some half a dozen driving forces and about ten focus areas). This recommendation helped ensure that driving forces and focus areas of competences could be analysed in sufficient depth in the panel reports. All the reports had the same heading structure which made it easier to make comparisons between them.

All panels identified about 6–10 focal competence areas and, for each of these, they elaborated the underpinning scientific and technological bases, relations to emerging societal and industrial needs, with illustrations of future possibilities by way of concrete manifestations (such as innovations). Often, the panels also presented their thoughts as to how the focus areas might be best developed through R&I policy measures or other actions. Examples of these focus areas are given in Table 1. Here, it is worth highlighting that the identification of the competence area *Assessment and management of global risks* (which have partly realised through the financial and economic crisis of 2008–09) was driven by the recognition that Finland is strongly dependent on global developments, due to its relatively small size and the structure of its economy. In consequence, the panel felt that it is pertinent develop competencies for the analysis of such developments in view of policy and decision making activities.

Apart from the 10 panel reports, a synthesis report of some 70 pages was published, aimed at a general audience and those policy makers who would not have the opportunity to read the full

Table 1. Examples of focal areas of competences identified by the panels.

Panel	Examples of focal competence areas
1. Learning and learning society	• Neurological, cognitive, motivational and social basis of learning • Practices of life-long learning, the education system and informal learning • Civic skills and competences, life control and social innovations
2. Services and service innovations	• Business competence in services • Culture and adventure services • Renewal of public services
3. Well-being and health	• Physical exercise and nutrition research • Mental health and substance abuse research • Home care and telecare technologies
4. Environment and energy	• Operation of ecosystems • Water systems and water cleaning technologies • Smart sensors and new energy conversion and storage technologies
5. Infrastructure and security	• Environmental know-how and technology • Logistic know-how and security of supply management • Integration know-how
6. Bio-expertise and bio-society	• Complete use of renewable natural resources • Development of bioproduction • Measurement methods and diagnostics • Management and modelling of biological knowledge
7. Information and communications	• Sensor technology applications • Data mining, analysis, management and retrieval • Bio-information technology
8. Understanding and human interaction	• Multicultural competence • Life-long learning and understanding • Deep understanding of own culture
9. Materials	• Printed electronics • Biomimetic materials • Controlled synthesis of polymers
10. Global economy	• Assessment and management of global risks • Impacts of business globalisation on national economies • Management of innovation processes

panel reports.[5] The first part of the synthesis report summarised selected driving forces from all the panel reports. The second part had sections on each panel, highlighting the focus areas that the panel had stressed in its own report. The third part explored synergies at panel interfaces, building upon the results from the third meeting for the panel chairmen. The synthesis report was produced by the civil servants on the Core Group, assisted by editorial support. It was also translated into English, Chinese and Japanese.

The panel reports were published on 13 June 2006 in the Auditorium of the Museum of Contemporary Art (Kiasma) in central Helsinki. This event was attended by close to 200 participants, including many influential R&I policy makers. Further to the publication of the reports, FinnSight received quite a bit of media attention, as evidenced by the large number of related articles in professional magazines, for instance.

(d) *Subsequent policy developments*

Because foresight is a highly systemic instrument with close linkages to other policy processes that contribute to the development of the R&I system, it is not straightforward to assess to what extent subsequent policy developments may have been influenced by foresight recommendations (cf. Smith 2000; Smits and Kuhlmann 2004). Such developments often build on various processes of sense-making and negotiation that draw upon on foresight conclusions. With this important proviso, we briefly characterise selected policy developments that have been influenced or at least informed by FinnSight.

In 2006, the STPC[6] referred to FinnSight in its comprehensive report which contained numerous proposals towards the development of the Finnish research and innovation system (STPC 2006). Also, in the same month when the results of FinnSight were published, the STPC took steps towards the establishment of Strategic Centres for Science, Technology and Innovation[7] in fields that are important to the future of Finnish society and business and industry. These centres – which are organised as non-profit seeking companies owned by the state, research institutes, universities and private companies – will establish new ways of allocating resources to research activities, in accordance with research plans that are jointly agreed upon by companies, universities and research institutes, with the aim of fostering research that will offer possibilities for the commercial deployment of results within 5–10 years. These centres seek to build a highly efficient framework for enhanced collaboration between companies, universities, research organisations. By June 2009, six strategic centres have started their operations (i.e. energy and environment; metal products and mechanical engineering; the forest cluster; health and well-being; and information and communication industry and services; built environment).

Although the establishment of these centres cannot be attributed to FinnSight, the results of FinnSight were published at an opportune moment for the development of the strategic research plans for these centres. Also, some FinnSight panellists have made contributions to the establishment of these centres, which has created informal links between FinnSight and the centres. Indeed, although the tight schedule of FinnSight was a challenge for the process design, this schedule was nevertheless well-justified by the need to ensure that the results would be made available when needed.

Within the two funding agencies, the Academy of Finland and Tekes, FinnSight has served to inform their respective strategies. In view of citations, FinnSight has also served as a source of information for various regional and organisational strategy processes in Finland. It has also aroused international interest, considering that references to FinnSight reports have been made in documents published in Japan, South Korea and Canada and by the European Commission.[8]

One of the objectives of FinnSight was that it should encourage other actors of the R&I system to initiate foresight activities. Here, it is noteworthy that Sitra, the Finnish Innovation Fund, launched a so-called Future Forum already at the time when FinnSight was running. This forum was organised as a panel-centric process which, in contrast to FinnSight, focused on somewhat more general questions of societal well-being and economic policy. The activities of this forum and FinnSight were loosely co-ordinated; but not formal links were established (e.g. in the sense that the results of the Future Forum would have depended on those of FinnSight).

Furthermore, in 2007 the Ministry of Trade and Industry started a process towards the establishing a National Innovation Strategy, with the aim of paving the way for measures that the broadening scope of innovation policies would call for. This workshop-based process focused on 11 themes of which addressed structural issues (e.g. regional innovation policy; intellectual property rights; demand-orientation of innovation activities). The objectives of this process – whose

results were published in June 2008 – thus complemented those of FinnSight which purposely did not address structural questions. Building on the National Innovation Strategy, the Government has produced its Report on Innovation Policy which has been debated in the Parliament in late 2008.

4. Axes of balance in FinnSight

Although formal evaluation of FinnSight has been carried out, the panellists were nevertheless asked to provide feedback on the foresight process and the panel reports in April 2006. In this survey, more than 95% of the respondents[9] indicated that the foresight process had been rewarding to them (in the sense that responded with a 5, 6 or 7 on a Likert-scale from 1 – fully disagree to 7 – fully agree). Likewise, 90% noted that their contributions had been properly accounted for in the reports; and 88% thought that FinnSight will be important to the development of the Finnish R&I system. Furthermore, well over half the panellists (54%) reported that they had consulted at least four other experts beyond the other panellists before submitting their proposals for driving forces and focus areas.

As instruments of strategic policy intelligence (Smits and Kuhlmann 2004), foresight exercises such as FinnSight must respond to implicit and explicit expectations that are placed on them by diverse several stakeholders. These expectations can rarely be met unless the exercise achieves an adequate balance with regard to design attributes that pertain to alternative uses of results, modes of stakeholder participation, perspectives on analytical methodologies and management styles, among others (cf. Rask 2008). We therefore reflect on FinnSight along four design attributes (see also Könnölä et al. 2009) that are concerned with (1) instrumental vs informative use of foresight results; (2) exclusive vs extensive engagement of stakeholders; (3) consensual vs dissensual development of recommendations; and (4) fixed vs autonomous management of the process.

4.1. *Instrumental vs informative use of foresight results*

In terms of alternative modes of harnessing foresight conclusions, *instrumental use* of foresight refers to the development and deployment of results for specific and foreseen decision-making situations, while *informative use* refers to the development of an improved shared understanding of the R&I system and possibilities for improving it (but not necessarily with close links to any particular decision-making situation).

Along this axis, it is noteworthy that the FinnSight reports were published in June 2006 when the Government took decisions towards the implementation of a national strategy in which the establishment of Strategic Centres of Science, Technology and Innovation was an important part. This opportune timing gave possibilities for instrumental use, because the foresight results characterised focal competence areas that would plausibly merit explicit attention in strategy implementation. These possibilities were also a motivating factor, because the panellists could pursue their work, convinced that senior policy makers would pay close attention to their results. This notwithstanding, the broader processes of using foresight results were not part of FinnSight which was emphatically framed as a foresight project that would produce informational results, in the expectation that different organisations would use these results in whatever ways they would see pertinent. For instance, FinnSight synthesised consensual information about overarching developments that were relevant to many organisations in the R&I system (e.g. universities, industrial federations, private enterprises).

4.2. *Extensive vs exclusive stakeholder engagement*

Extensive stakeholder engagement refers to foresight approaches where the number of participants is high and where possibilities for participation may be opened to all interested participants from different stakeholder groups, even if this may cause a certain degree of unpredictability and cause management challenges. In contrast, *exclusive stakeholder engagement* refers to expressly controlled stakeholder participation that may be driven, say, by the need to ensure a balanced representation of the different stakeholder groups.

Along this dimension, FinnSight was unequivocally characterised by exclusive stakeholder engagement. This was partly because the panel approach, together with the tight schedule, placed constraints on the number of participants that could be invited; moreover, there was a need to achieve a balance of scientific and technological fields, to ensure that the conclusions would be well-founded (thus mitigating the possibility that some fields would be under- or over-represented due to a less controlled process of inviting participants). This notwithstanding, some steps towards broader stakeholder engagement were taken, most notably by encouraging the panellists to consult their own professional networks when making their contributions to panel work.

4.3. *Consensual vs dissensual development of recommendations*

Consensual development of recommendations can be understood as the creation of jointly characterised priorities, collaborative networks and future actions, with an emphasis on points of mutual agreement and apparent consensus. This can be contrasted with *dissensual development* where the emphasis is purposely on retaining the full range of diverse priorities that may be suggested by different value networks and coalitions that may reflect rivalling visions or even incompatible perspectives on the future (Könnölä, Brummer and Salo 2007).

Along this attribute, FinnSight was closer to the consensual approach. To some extent, this was because the panellists were encouraged to collaborate with the aim of generating shared deliverables that would capture their joint reflections. Indeed, the characterisation of focus areas in panel reports suggested that the panels had succeeded in reaching a consensus (which was actually the case in most panels), the reports were possibly more amenable for instrumental uses in decision making. Yet there were methodological steps that retained dissensual perspectives as well. For example, the compilation of documents from the internet-based questionnaires showed the full distributions of the panellists' assessment ratings, even though although these distributions were not, however, retained in the development of the final panel. Some commentators noted that this variability would have been of sufficient interest to deserve publication (cf. Ansoff 1975; Könnölä, Brummer and Salo 2007) while others found that the full length panel reports were more interesting than the synthesis report which, again, represented a further step towards distilling consensual messages from the panel reports.

4.4. *Fixed vs autonomous management*

Fixed management can be characterised as a centralised approach where the scope and the methods of the foresight exercise are defined during its earliest phases and then imposed consistently through reasonably tight controls. In contrast, *autonomous management* refers to more open-ended processes that are intermediated by the foresight co-ordinators (cf. the Core Group in FinnSight) who facilitate relatively autonomous participant-led activities in the work of expert panels or other approaches (Salo, Könnölä, and Hjelt 2004).

In FinnSight, a balance along this dimension had to be achieved to ensure that the process would contribute to the attainment of foresight objectives while avoiding the risks of imposing too onerous a methodology that might be ineffective or even resented by the panels. Some aspects of fixed management were adopted by agreeing on a systematic methodology that provided the same conceptual and sequential structure to the work of each panel. This helped ensure that panels would produce coherent and comparable outputs.

This notwithstanding, the panels enjoyed full freedom in choosing the topics they would focus on. The panels were not 'fed' by *any* prior information and the results could be fully attributed to the panels. Also, the panel chairmen had quite a bit of freedom in facilitating the panel meetings as they saw best: here, the aim was to ensure that the chairmen would take charge of these meetings and that they could also adapt the use of methodological tools that were offered to them in a responsive manner (Salo, Könnölä, and Hjelt 2004). While this did lead to some divergence between panels (for instance in the use of compilation documents from the internet-based questionnaires), the partial autonomy that was given to the chairmen also served to empower them.

5. Discussion

We conclude with a few methodologically oriented observations on FinnSight. First, the shared analytical framework – which consisted of driving forces and focus areas of competences – was vital in ensuring that the panels' efforts would remain focused on the objectives of the exercise. This framework helped mitigate the risk that the panel discussions would drift to the structural issues which are often easier to debate than thematic R&D issues about which all panel members do not have equal expertise.

Second, in terms of its methodological approach, FinnSight was unique thanks to the extensive combination of internet-based questionnaires and facilitated workshops. This combination helped ensure that all panellists could contribute to the process and that the contributions of all panellists would be duly reflected in the panel reports. It also alleviated the burden of the panel chairmen who could make use of compilation documents effectively when writing the panel reports. Also, from the view of the perceived balance of the exercise, it was appropriate that all the materials were produced by the panels themselves. This approach obviated the need to 'feed' the panels with background documentation, which would have necessitated uneasy choices as to what material the panels should have been provided with.

Third, panels that addressed S&T domains with more clearly interpretable titles (e.g. health and well-being, materials) found it easier to establish the boundaries of their work than those that had somewhat less conventional and more 'nebulous' titles (e.g. learning and learning society, understanding and human interaction). As a result, these latter panels spent more time on demarcating their boundaries and clarifying their objectives; and yet, they produced insightful and even partly surprising characterisations. This suggest that while 'unusual' panel characterisations may generate fresh perspectives, more time may be required to lay the grounds for the generation of such perspectives.

In hindsight, the development of novel methodological approaches in FinnSight – most notably the definition of dedicated units of analysis (driving forces, focus areas of competences) and the extensive deployment of internet-based tools for engaging the panel members – was partly motivated by the tight schedule that was largely implied by the broader policy context. In view of positive experiences, we believe that analogous approaches may be useful also in other contexts where expert panels are required to generate coherent and comprehensive foresight results in the presence of tight timeframes and high expectations.

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Notes

1. The views expressed are purely those of the authors and may not in any circumstances be regarded as stating an official position of the European Commission.
2. The Academy of Finland is comparable to the US National Science Foundation and the UK Research Councils in that it allocates funding to high-quality basic research based on the evaluation of submitted research proposal. It also supports international scientific cooperation and acts as an expert organ in issues related to science policy. See http://www.aka.fi/en-gb/A/ for details.
3. Tekes provides project-oriented funding to universities, polytechnics, research institutions and industrial firms, with the aim of promoting technological breakthroughs and innovations in all industrial sectors and services. See http://www.tekes.fi/en/community/Home/351/Home/473 for details.
4. The funding decisions of the Academy of Finland are taken by external scholars (usually university professors) who serve on its councils, while Tekes takes its funding decisions based on the judgement of its own experts.
5. The English version of the synthesis report is available at http://www.tekes.fi/julkaisut/Finnsight_2015_EN.pdf, which is also accessible from the website http://projects.tekes.fi/opencms/opencms/Projects/FinnSight_2015_en/
6. The remit of the Council (which has been renamed as the Research and Innovation Policy Council as of January 2009) is to assist the Government and its ministries by addressing, for instance, major matters in relation to research and innovation policy by preparing related plans for the Government.
7. See http://www.tekes.fi/eng/strategic_centres/
8. For examples, see http://crds.jst.go.jp/cgi-bin/search.cgi?query=foresight, http://www.kicttep.re.kr/app/notice/down.jsp?_pid=global_report&_idx=1415&fno=1841, http://www.reperes.mdeie.gouv.qc.ca/fr/index.php?idNewsLetter=117&idSommaire=3, http://www.energy-enviro.eu/index.php?PAGE=394&NODE_ID=394&LANG=1 and http://www.risoe.dk/rispubl/art/2007_203_paper.pdf
9. The respondents included 57 out of the 120 panellists.

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