2010

Strategic Foresight in Public Policy: Reviewing the Experiences of the UK, Singapore, and the Netherlands

Beat Habegger

Futures 42 (2010) 49–58

Contents lists available at ScienceDirect

Futures

journal homepage: www.elsevier.com/locate/futures

Strategic foresight in public policy: Reviewing the experiences of the UK, Singapore, and the Netherlands

Beat Habegger *

Center for Security Studies, ETH Zurich, Weinbergstrasse 11, WEC E25, 8092 Zurich, Switzerland

ARTICLE INFO

Article history:
Available online 22 August 2009

ABSTRACT

In an interdependent and complex world, only few public policy challenges can be confined to one particular policy area anymore. Many governments have realized that a single-issue focus is often insufficient in dealing with emerging threats and opportunities. They have therefore started to experiment with strategic foresight that deliberately cuts across the traditional boundaries of policy areas and government departments. This article reviews the foresight activities of three countries that have been at the forefront of this trend: the United Kingdom, Singapore, and the Netherlands. To this end, the article discusses the concept of strategic foresight and explains the two distinct ways in which it contributes to public policy-making: on the one hand, it informs policy by providing more systematic knowledge about relevant trends and developments in an organization's environments; on the other hand, it acts as a driver of reflexive mutual social learning processes among policy-makers that stimulate the generation of common public policy visions. The article concludes by drawing lessons with regard to the key success factors allowing strategic foresight to make an effective contribution to public policy-making.

1. Introduction

Ever more interdependencies and complex interactions between the economic, environmental, technological, or socio-political sectors of society cloud the predictability of future events and augment the uncertainty about the causes, drivers, and consequences of human action. Most of tomorrow's opportunities and threats are unknown, and it is often unclear what skills, resources, institutions, and policies are required to cope with them. The unbiased observer may assume that modern communication and information technology reduces uncertainty by making more information more easily available and accessible than ever before. Paradoxically, however, its real effect is often the opposite: information overload leads to a "poverty of attention" [1, p. 43] that complicates the process of filtering out the critical signals from the distracting noise. Sporadic assessments of current and future trends and developments, based on the intuition of those in charge as has been the practice in the past, are no longer sufficient, and the lack of respective strategic and operational capacities may become even more dangerous if complexity and the dynamics of change continue to increase. Policy-makers in government (but also leaders in business or civil society organizations) are increasingly forced to assess their environments systematically and to identify the relevant upcoming issues early on. They must think ahead strategically in order to reduce "surprises", to increase the room for maneuver, and to improve the overall flexibility of governance.

* Tel.: +41 44 632 85 32; fax: +41 44 632 13 72.
E-mail address: habegger@sipo.gess.ethz.ch.

0016-3287/$ – see front matter © 2009 Elsevier Ltd. All rights reserved.
doi:10.1016/j.futures.2009.08.002

Strategic foresight can support decision-makers in these tasks and help them to develop future-oriented policies. Many of the ideas on foresight have their origins in management science [2–6], and a large part of this approach was developed and first tested by practitioners in companies [7,8]. There is also a significant body of literature that specifically investigates the application of foresight in public policy, both in conceptual terms [9–11] as well as in terms of the foresight experiences of individual countries (recently [12–15]). However, there are only few comparative studies across multiple countries (for example [16,17]), and the recently emerging concept of cross-sectoral and cross-departmental foresight, which is at the heart of this article, has not yet found strong resonance in the academic literature [18].

In the past, foresight in public policy was usually focused on one particular policy field [19, p. 3], most often related to science, technology, and innovation policy. A survey of the International Council for Science [20], for instance, gives an overview of foresight exercises in more than 20 industrialized, transition, and developing countries since 1995, and a similar report of the Centre for Science and Technology Studies [21] portrays foresight studies in 39 countries worldwide. These surveys show that countries have applied quite different conceptions of foresight, particularly in terms of how broadly the policy areas to be covered are conceived. Most studies still follow a narrow focus on science and technology, but some have begun to integrate societal or economic issues and developments – a trend that is likely to firm up in the future. Many countries – including Australia, Canada, Finland, France, Japan, and New Zealand – now also focus on other policy areas such as public health,[1] national security,[2] or the environment,[3] and international initiatives are starting to combine the various national experiences in order to lift them to a higher strategic level.[4]

Only few contemporary challenges can be confined to one policy area anymore, and governments have realized that a single-issue focus is in many instances insufficient. Consequently, they have started to experiment with foresight that cuts across the traditional boundaries of policy areas and government departments. This article will concentrate on three countries that have been at the forefront of this trend: the United Kingdom (UK), Singapore, and the Netherlands. To this end, the paper first discusses the concept of foresight and explains how it may contribute to public policy-making. It will then pursue a review of the foresight activities in the above-named countries. Finally, it will draw some lessons with regard to the key requirements and success factors if foresight is to make an effective contribution to the development and implementation of public policies.

2. Strategic foresight in public policy

Strategic foresight can be defined as a deliberate attempt to broaden the "boundaries of perception" [24, p. 93] and to expand the awareness of emerging issues and situations. It aims to support strategic thinking and decision-making by developing a range of possible ways of how the future could unfold [25, p. 12, 26, p. 5, 27, p. xvii]. Strategic foresight integrates the perspectives, procedures, and tools of both trend research and futures studies [6, pp. 17ff.]: trend research, on the one hand, deals with the early detection and interpretation of *current* political, economic, social, technological, or other developments and aims to evaluate the impact of relevant changes on society and individuals. Futures studies, on the other hand, tries to capture and anticipate potential *future* developments and to generate visions of how society evolves and what (policy) options are available to shape a desired future.

Environmental or horizon scanning, business, competitive or technology intelligence, and strategic early warning or issue management all focus on the detection, analysis, and diffusion of strategically relevant information. They aim to gather evidence about issues, trends, advancements, ideas, and events in the perceptible environment that an organization is confronted with at the present time [6, p. 30]. Strategic foresight, however, involves more than detecting and analyzing information, which is a significant part of strategic foresight, but nonetheless only the starting point of a more comprehensive foresight process. This process is characterized by a long-term, interdisciplinary, participative, and communicative perspective [6, pp. 20f.] that attempts to build networks across professional communities, enables broad-based social learning, generates scenario-based knowledge, and eventually results in visions of (alternative) policies. The process of strategic foresight can be conceptualized and implemented in various manners, but most scholars follow a rather similar logic [6, p. 42] that roughly divides the process into three phases [9, pp. 5f., 25, pp. 14ff., 24, pp. 92f., 26, pp. 6ff.] (Fig. 1):

- the early detection and analysis of information,
- the generation of foresight knowledge,
- and the development of future (policy) options.

[1] Examples include the joint project of the governments of Australia and New Zealand to assess the potential impact of emerging technologies on public health systems (http://www.horizonscanning.gov.au) or the similar activities in Canada (http://www.cadth.ca/index.php/en/hta/programs/horizon-scanning).

[2] Examples in the domain of national security include the "DCDC Global Strategic Trends Programme 2007–2036" of the United Kingdom Ministry of Defence [22] or the report "Securely into the Future – Ministry of Defence Strategy 2025" of the Finnish Ministry of Defence [23].

[3] See, for example, the activities of the UK Government Department for Environment, Food and Rural Affairs: http://horizonscanning.defra.gov.uk.

[4] An example is the pilot project "Joint Horizon" conducted by the ForSociety ERA-Net: http://www.eranet-forsociety.net.

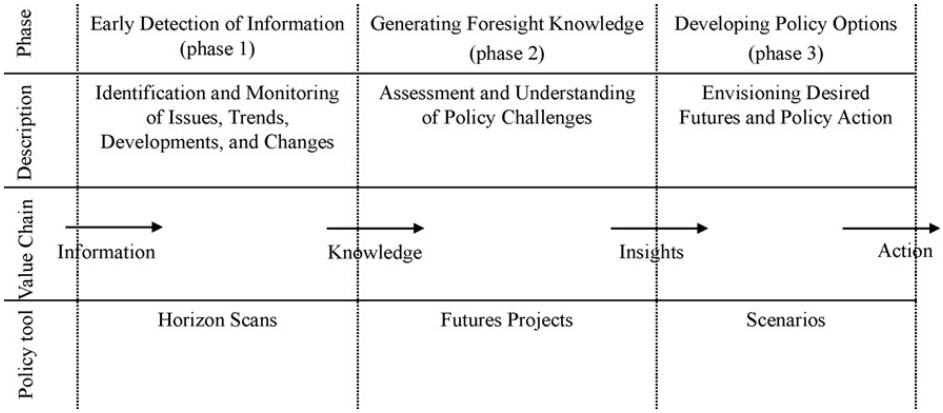

Fig. 1. Three phases of a foresight process (own illustration based on Schultz [9] and Horton [26]).

Early detection and analysis (*phase 1*) addresses the identification and continuous monitoring of all relevant information about novel and unexpected trends and issues as well as persistent problems in an organization's external environment [2, pp. 28–29]. The conceptual idea is to establish a systematic and structured evidence-gathering process that detects discontinuities in trends hitherto perceived as stable and unchanging [28, pp. 501–506]. These discontinuities are usually foreshadowed in the form of "weak signals" [3] that indicate changes long before they become general knowledge and come to the attention of policy-makers. The extensive scanning of environments rests on the assumption that the continuing accumulation of information allows the observer to extract more explicit evidence. Horizon or environmental scans are expected to provide an understanding of what is happening in an organization's environments and why, what processes induce and support change, the relations between these processes, the main actors and their objectives, the anticipation of change, and the required capacities and resources. The aim of this first phase is to avoid strategic surprises by giving decision-makers sufficient lead-time to take the appropriate countermeasures against emerging threats.

The generation of foresight (*phase 2*) addresses the assessment and understanding of selected policy challenges. After information is scanned, collected, filtered, and processed, the gathered evidence is interpreted to tease out "the implications of the various possible future views for a particular organization" [26, p. 7]. Specific issues that may become more important in the future are selected and studied comprehensively. The selection of issues is based on specific criteria: they should, for example, have a high potential impact on society and the economy, they may be triggered by new technologies, or they may represent areas where change is complex and rapid and future developments highly uncertain. Another selection criterion is the political support provided by the government and other important decision-makers to ensure that new insights will later lead to political action. Such "futures projects" must be based on the best available evidence and try to capture a particular issue in all its relevant dimensions in order to draw a realistic picture of the "present implications of possible future events" [27, p. 48] across a broad range of policy areas.

The insights generated through futures projects lead to the development of policy options (*phase 3*). As there is no such thing as "the future", a variety of potential futures are explored, because under conditions of "heightened uncertainty", the best course of action is to look forward purposefully and to present "alternative scenarios" [29, pp. 88, 93]. Scenarios may distinguish between possible, plausible, probable, and preferable futures as captured by the "futures cone" (see Fig. 2 based on [25, p. 16f.]):

- *Possible futures* include everything we can imagine, regardless of how unlikely it may be, and may involve the results of knowledge that we do not yet have, but that may be available in the future.
- *Plausible futures* have a reasonable probability of occurring, as they are in line with the current general knowledge and understanding of how the world operates.
- *Probable futures* are likely to happen, as they are largely extrapolations of the present and the past into the future.
- Finally, in contrast to the previously described futures, the *preferable futures* are not a product of (non-) existing knowledge, but are based on subjective judgments and values, as they describe the outcomes desired by individuals or organizations.

Preferable futures are envisioned by crafting normative scenarios that explore aspects of desired policies. However, formulating a broadly shared consensus on such preferred futures is rarely feasible in public policy, because deliberations among many stakeholders with very diverse interests and values almost inevitably lead to contradictory recommendations [30, pp. 41f.]. Consequently, the construction of such scenarios should be understood as an open discourse that enables interaction and communication among participants and eventually leads to a mutual understanding of each other's notions of preferred futures.

The described process leads to the conclusion that strategic foresight can contribute in two different ways to public policy-making [18, pp. 372ff., 376f., see also 6, pp. 42–45, 25, p. 15]: first, it informs policy by *providing more systematic knowledge* about potentially relevant trends and developments in the perceptible political, economic, social, or technological

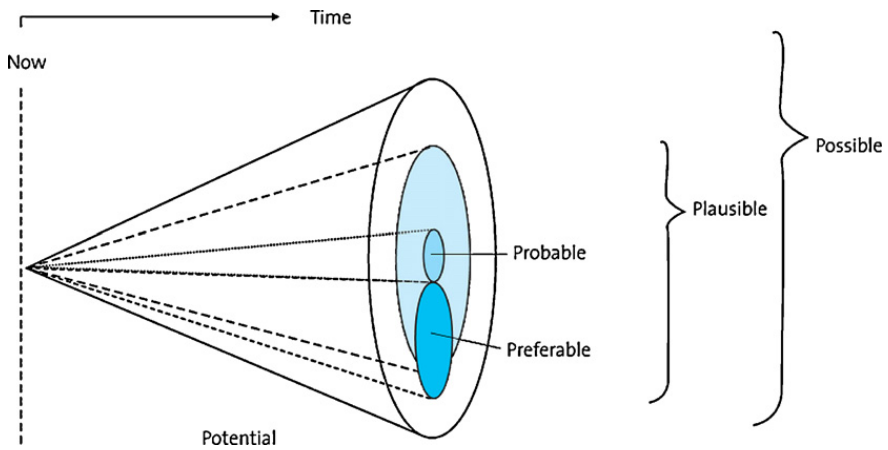

Fig. 2. The "futures cone" (illustration from Voros [25, p. 16]).

environments of an organization. This focus on the collection, documentation, and delivery of information corresponds with the first phase of the described process and emphasizes the production of "concrete informational products" such as reports, policy briefs, or scenarios. However, this traditional approach has been criticized as being too static and not appropriately taking into account the future-orientation of foresight as it is expressed in the second and third phase of the described process.

Consequently, the focus has now shifted to a second function that conceptualizes foresight as a driver of *reflexive mutual social learning processes* among policy-makers that stimulate "the emergence of common visions" [21, p. 373]. This interpretation draws on the resources of all three phases and conceives foresight as a process that improves the capabilities of governments for strategic thinking and decision-making, because it enables learning, creates linkages, networks, and knowledge flows between people and organizations, and generates knowledge, ideas, and visions.

In other words: foresight not only improves policy-making through concrete products, but also through the participation of stakeholders in the process of developing foresight as such. Such engagement is expected to lead to enhanced communication, extended networks, better coordinated preferences, and even changes in thinking that raise the strategic decision-making capabilities of governments. It helps policy-makers to make better informed choices, to improve their political responsiveness, and facilitates policy development and implementation.

3. Cross-cutting foresight programs in three countries

Three countries that have been at the forefront of establishing foresight programs that deliberately cut across government departments and policy areas are the UK, Singapore, and the Netherlands. The following sections will outline the institutional setting and the concrete programs and activities that they have developed in recent years.

3.1. United Kingdom Foresight Programme

The early roots of the UK Foresight Programme go back to the 1960s, when a new focus on science and technology (S&T) policy addressed the widely recognized innovation problem in the UK. The emergence of information technology and the necessity of increased investments in research and development forced policy-makers to make choices between competing demands and to set the right priorities in light of the country's economic requirements [15, pp. 2–6]. In the early 1990s, an interdepartmental working group commissioned four academic and private institutions to develop methodologies to identify and prioritize emerging technologies of importance to the UK. The resulting vision of "key technologies" paved the way to what in 1994 became the UK Foresight Programme [15, p. 7].

After 2002, the Programme's overall scope was widened by lifting its restriction to S&T policy. It now envisaged a better balance between more technology-oriented projects and projects where innovation entails opportunities to tackle societal, environmental, or other problems. In July 2004, the UK Treasury published the "Science and Innovation Investment Framework 2004–2014", which specifically called for the establishment of a centre of excellence in horizon scanning [31, pp. 115, 117]:

> All Government departments will be using sophisticated scientific horizon-scanning techniques, linked both to their own policy horizon scanning, that of other departments, and to the OST horizon-scanning centre. [...T]he Government's Chief Scientific Adviser [...] will build up a single centre of excellence in science and technology horizon scanning.

The UK Horizon Scanning Centre (HSC) began work in December 2004 and aims to "feed directly into cross-government priority setting and strategy formation, improving Government's capacity to deal with cross-departmental and multi-disciplinary challenges" [31, p. 15].

Foresight activities are widespread in the UK government. A variety of departments have established their own programs, and several have included horizon scans such as the Ministry of Defence, the Department of Environment, Food, and Rural Affairs, the Department of Health, the National Health Service, and the Department for Business, Enterprise and Regulatory Reform. The government requires all departments to "ensure that adequate horizon scanning procedures are in place [...] and horizon scanning evidence is appropriately considered and, where necessary, acted upon" [32, p. 4]. Consequently, the HSC is not intended to replace horizon scanning in departments, but rather to "provide a higher-level strategic context to those other activities, interacting with and informing them" [31, p. 117].

The UK Foresight Programme is part of the Government Office of Science, which is located in the Department for Innovation, Universities and Skills. It is headed by the Government Chief Scientific Adviser (GCSA), who is responsible to the prime minister and cabinet for the overall quality of scientific advice within government and for providing personal advice to them on scientific and science policy issues. The GCSA oversees the Foresight Programme and secures coordination and exchange between the departmental chief scientific advisors. An Advisory Board, which is composed of representatives of the public, private, and academic sectors, was established in December 2007 to advise the GCSA on the strategic direction of the Foresight Programme.

The Foresight Programme can roughly be grouped into three distinct programs or activities: the horizon scans, the futures projects, and the public outreach program.

First of all, two complementary horizon scans, the Delta Scan and the Sigma Scan, provide an intersectoral informational basis to underpin all foresight activities across the UK government. These ongoing scans look ahead over a range of up to 50 years to uncover "contradictions and ambiguities in mapping the turbulence of change" [9, p. 5]. The Delta Scan, with more than 250 S&T experts as contributors, gives an overview of future S&T issues. The Sigma Scan is a synthesis of other horizon scanning sources that may be characterized as a "scan of scans" and covers trends across the full public policy agenda. It draws its information from think-tanks, corporate foresight, governments, academia, NGOs, blogs, mainstream media, or music, depicting the diversity of potential information sources.

Both scans result in concrete products: so-called issue papers briefly describe the identified trends and how they may unfold in the future. Each issue paper is classified according to a hierarchical system, starting from the classic STEEP[5] categories (e.g., environment) to a domain (e.g., climate change) to a sub-domain (e.g., ozone layer). They provide an abstract of the issue, address possible implications, identify early indicators, drivers, and inhibitors, reveal parallels to previous events, and provide further links and sources. Furthermore, each paper is labeled with a number of so-called issue markers that provide indicative information about the possible likelihood, impact, distribution, severity, and development time of each issue. Finally, the papers are classified into a number of genres, according to whether an issue paper represents a weak signal, a forecast, a key driver, a scenario, or a wildcard, in order to indicate what sort of critical thinking should be applied by reading the paper. These scans point to the first phase of a comprehensive foresight process and provide input for a more in-depth treatment in subsequent process phases, for instance by identifying topics for futures projects or encouraging policy-makers and strategy teams to develop scenarios of potential futures.

The second main element is the rolling program of three or four futures projects to create high-quality overviews of a given issue and to develop a vision of how the UK can meet the associated future challenges. Each project lasts between 18 and 24 months, yet it should have a longer term impact by raising awareness, offering policy recommendations, and establishing networks among professionals within and outside of government who can translate the recommendations into policy [15, p. 17]. A futures project must either deal with some important current issue that science, technology, the social sciences, and economics can help address, or with a current aspect of science or technology that is likely to have wider potential in the future (see for the following [33, p. 1701]). In each topic, prognosis covers a range of at least 10 years in areas where the future direction of change is rapid, current trends are uncertain, or different trends may converge. A topic must not duplicate work taking place elsewhere, must have potential outcomes that can lead to specific actions, must be multidisciplinary, and must be backed by a commitment from the potential beneficiaries to ensure that they want to hear the results and act on them. The project selection is carried out in a wide and inclusive consultative process. On the one hand, the foresight team posts a short list of topics on its website for comments and consults scientists, government departments, and corporations. On the other hand, each project needs a sponsoring minister to ensure high-level political backing and is only started when support from all relevant stakeholders is guaranteed.

A high-level stakeholder group oversees each project. It is chaired by the minister of the lead department, is led at a senior level by the GCSA, and comprises senior decision-makers from relevant departments, research bodies, and other organizations. A steering group invites between 90 and 120 scientists from different disciplines to join the project in order to review the scientific literature extensively and to participate in workshops or seminars. The ultimate objective is to produce a set of clear, comprehensive, and comprehensible project reports, often rewritten by specialized science writers to make them accessible to all the interdisciplinary team members. A range of techniques (such as scenario building or technology roadmapping) enables analysts to trace different possible futures and to describe likely outcomes for alternative visions [33, pp. 1701f.]. It is a primary aim of futures projects to influence both policy and funding decisions made by government. Therefore, the project report is complemented by an action plan to which the ministerial sponsor must agree. This plan is

[5] STEEP refers to the method of systematically structuring identified environmental factors along the analytical categories of societal, technological, economic, ecological, or political factors.

widely circulated to stakeholders and made publicly available to ensure that the findings effectively feed into the policy process. Furthermore, a follow-up meeting is held for each project a year after the results are published to assess whether and how the project findings are being addressed and are having an impact.

The third pillar of the Foresight Programme is a broad public outreach that builds networks of futures thinkers and practitioners in the public, private, academic, and other sectors. The HSC established the Futures Analysts' Network (FAN Club) as a forum where those who have an interest in horizon scanning and futures analysis can meet to exchange new ideas, innovative thinking, and good practice. Its meetings are devoted to topics as diverse as "The Role of Futures Thinking in Government Strategy" or "Britain's Future Abroad". Speakers from different professional communities give presentations, lead workshop sessions, or present case studies with the goal of stimulating discussion, educating participants on the use of futures techniques, and adding value to the Foresight Programme by capitalizing on public input.

Overall, the Foresight Programme is considered to be effective in informing strategic policy-making in the British government. While it was initially centred on S&T policy – and still places a strong emphasis on these issues – it has continually broadened its scope and today provides policy-makers with a perspective on the full public policy agenda. The Programme covers the whole spectrum of a comprehensive foresight process – from early detection and the generation of foresight knowledge to the development of policy options – it links expert knowledge to a long-term perspective, and employs sophisticated techniques of futures analysis to raise the government's strategic policy-making capacity.

3.2. Singapore's Risk Assessment and Horizon Scanning

Around the turn of the new millennium, Singapore, like many other countries in the region, was affected by a number of strategic surprises. It had already experimented with scenario planning since the 1980s and had, for example, developed scenarios dealing with possible economic shocks.[6] However, events such as the terrorist attacks on the United States (US) in 2001, the plot to attack the embassies of the US, the UK, and Israel in Singapore by the radical Islamic organization Gema'ah Islamiyah uncovered in December 2001, and, most importantly, the outbreak of the SARS epidemic in the first half of 2003 showed that scenario planning on its own could not help anticipate strategic surprises in an increasingly complex environment [35, p. 66].

The government reacted by conducting a comprehensive review of the national security structures, processes, and measures, which culminated in the release of a new strategic framework for national security in July 2004. This framework established a networked and coordinated approach to address national security issues and focused in particular on the emergent threat of transnational terrorism. One of the proposed measures was the establishment of a risk assessment and horizon scanning capacity [36, pp. 39f.]. Such a system ought to have two key objectives: first, to empower government in effectively detecting weak signals and indicators of exogenous shocks; and second, to encourage inter-agency collaboration and to foster informed analysis.

Singapore's Risk Assessment and Horizon Scanning (RAHS) system is not affiliated with a particular government department, but is part of the National Security Coordination Secretariat (NSCS) within the prime minister's office. It is structured into two main branches: the Joint Counter Terrorism Centre (JCTC), which provides strategic analysis on terrorist threats and aids in building the counter-terrorism capacities of its partner agencies; and the National Security Coordination Centre (NSCC) with the triple role of national security planning, policy coordination, and anticipating strategic threats [35, p. 58]. Since its inception in July 2005, the NSCC has spearheaded the development of the conceptual and methodological frameworks that underpin the RAHS system. It conducts research on concepts and methods with regard to risk assessment and horizon scanning, works with other partner agencies within the Singapore government, and draws on the expertise of other domains such as academia and private-sector initiatives. Within the NSCC, the Risk Assessment and Horizon Scanning Group is the focal point for foresight: it is the home of the Horizon Scanning Centre (HSC) and coordinates the various other institutions that contribute to risk assessment and horizon scanning.

Foresight in the Singapore government broadly refers to three distinct activities: a government-wide information network, a technology-oriented research and development competence centre, and a public outreach program.

The HSC first of all coordinates a government-wide information network of 20 agencies covering counter-terrorism intelligence, bio-medical and cyber-surveillance, maritime security, and energy security. Information-sharing within the network is facilitated by a Service Oriented Architecture (SOA) that documents the results of strategic scans in a technologically advanced way. This government-wide network is built on a node-to-node philosophy: each agency participates through an exchange of data with other agencies and thereby contributes to the creation of an interoperable collaborative environment. It allows the data and tools of different agencies to be treated and exploited as web services that are discoverable and sharable. Each agency thus feeds the system with information, collected from own scans as well as from open sources, and profits from the data provided by others. The system is run on two separate networks – a classified, or closed, network and an unclassified, or open, network.

The system helps users to process large amounts of information, to search for articles within its repository, and to perform a variety of analyses in order to extract the needed information quickly. It also allows users to meta-tag and comment on

[6] As a result, Singapore reacted faster and more effectively than other governments in the region to the Asian financial crisis of the late 1990s. Its GDP growth was less affected than was the case in neighboring economies such as Malaysia, Thailand, and Indonesia [34, p. 53].

incoming and existing data sets and to visualize them in order to amplify data outliers. Furthermore, data structuring services enable the building of system maps with associated consistency matrices and the performing of morphological analyses [37]. It is important to note that the system incorporates concepts, such as systems thinking and complexity analysis, that have previously been applied in workshop settings. The main challenge was therefore to translate them into software functions that can be easily used by all users in their daily operations even if they do not entirely understand the underlying theories and concepts.

The second pillar of the RAHS is the Experimentation Centre (REC), launched in October 2007 with a technology-oriented focus on exploration, experimentation, and enhancement of the RAHS system. The REC is managed by Singapore's Defense Science and Technology Agency and pursues two main activities: first, it conducts experiments to seed novel concepts and technologies in operational contexts and to determine, together with policy analysts, the usefulness of risk assessment and horizon scanning.[7] Second, it participates in case studies with government agencies on complex problems in order to demonstrate how the RAHS system can help to solve them. A notable example is the case study to explore scenarios about the introduction of avian influenza into Singapore and to assess the threat level of outbreaks occurring in the region. The REC thus has two main goals: on the one hand, it functions as a technology scanning and innovation centre. It provides a focal point for cooperation with other government agencies, academic institutions, and the private sector to explore and experiment with new and emerging technology tools related to the RAHS system. On the other hand, the REC ensures that the whole system undergoes continuous technological development and introduces novel concepts and technologies that expand its capabilities.

The RAHS system has further formulated a strategy to develop a process of public outreach to extend to agencies outside of government: most importantly, the RAHS system is engaging Singapore universities in order to get feedback on the system and support in building models that apply across the political, social, or economic domains. In these engagements, the RAHS system is made available for research purposes, which simultaneously facilitates the adoption of the concepts and methods of horizon scanning by younger Singaporeans. Furthermore, the NSCC helps oversee the graduate-level futures studies program based in Nanyang Technological University and is involved in organizing seminars and workshops, bringing in method experts and other speakers to expand the breadth and depth of future-oriented thinking within the Singapore government. Moreover, the outreach program also seeks to establish a trusted network of domain experts in the private sector in order to draw on their expertise and wisdom. Finally, in the longer term, the outreach strategy aims to extend horizon scanning beyond Singapore's borders by developing exchange programs with international partners [39, p. 22].

In conclusion, while Singapore's Risk Assessment and Horizon Scanning system is currently focused on issues of national security, it may be extended to other areas of public policy in the future. It facilitates inter-agency collaboration and pulls together all potentially relevant information from within government as well as from external sources to enable effective information- and perspective-sharing across government. Furthermore, it creates effective learning processes of perspective- and knowledge-sharing by reaching out to and connecting with a broad variety of professional communities. The RAHS system has become an essential part of the government's strategic planning process.[8] It encourages diversity, is conceived as a long-term investment, and is conceptualized as a process of discovery that may evolve in parallel with the improved understanding of what works best in Singapore's particular context.

3.3. The Netherlands Horizon Scan Project

In contrast to the permanent capacities of the UK and Singapore, the Netherlands Horizon Scan 2007 was a single foresight project carried out by a specially established team under the responsibility of the Commission for Consultation of Sector Councils (COS) [40, p. 7], which consists of representatives from research, society, industry, government, and think-tanks. On the basis of futures studies, the COS formulates priorities for society-oriented research, focusing in particular on those experts dealing with cross-sector subjects at the interface of policy domains and scientific disciplines. Based on a 2004 evaluation indicating a need for foresight studies of a broader nature, the COS initiated a horizon scan project at the end of 2005. When the final report was published in 2007, the project was no longer expected to remain a one-time measure: in February 2008, the tasks of the COS were transferred to the Knowledge Directorate of the Netherlands Ministry of Education, Culture and Science, and it is foreseen to create a permanent facility outside the ministry.

The Horizon Scan 2007 Project aimed to raise the awareness in the Netherlands about future threats and opportunities and their impact on society. For this purpose, the project intended to identify and prioritize the topics of foresight studies and other activities of the sector councils, to detect knowledge gaps and topics for further study, and to feed the results into strategic discussions in ministries, research organizations, societal organizations, and the business world. The process extended over two years, was subdivided into several phases, and resulted in several concrete products [40, pp. 10–16]: in the first phase, a list of opportunities and threats was constructed, based on an extended literature review and according to a set of selection criteria, namely the likelihood and impact of potential future events. The list was then divided into several

[7] Examples include a proof of concept on data anonymization, a project on situational awareness of maritime security threats, or the testing of the applicability of RAHS in the detection of threats in operations other than war [38, p. 22].

[8] See the speech of Professor S. Jayakumar, Coordinating Minister for National Security, at the opening of the International Risk Assessment and Horizon Scanning Symposium 2007 at the following website: http://enterpriseinnovator.com/index.php?articleID=10910&sectionID=25.

categories and extended and refined throughout the entire project in interaction with so-called sounding boards composed of Dutch and foreign specialists of different professional communities. Finally, the list was validated by comparing it with the outcome of the UK horizon scans.

In the second phase, the general public and the sounding boards members evaluated the list, which identified some 150 problems and opportunities. This process stimulated discussions and was executed through a public website as well as personal consultations. The third phase linked the identified threats and opportunities with one another and ordered them into trans-domain and trans-disciplinary clusters that revealed links between expected developments with potentially major social consequences. Again, sounding board meetings were held to discuss or reconstitute clusters and to start the selection of approximately 10 clusters of fundamental threats and opportunities. Finally, a specifically developed card game, which facilitates open discussion by training participants to provide creative answers to challenging tasks and hypotheses, helped participants to discover (surprising) interactions between subjects within and across clusters [40, p. 40].

In the fourth phase, the cluster descriptions were presented to a number of scientists, journalists, and politicians who were asked to write essays about possible future developments and to present their views of core issues (published in [41]). Based on the essays, the list of opportunities and threats, the cluster descriptions, and the uncovered relations among them, the project team drafted an alternative "State of the Nation" address. The goal was to raise awareness in the Netherlands about issues that require a perspective reaching further into the future than is the case in the address that is regularly delivered by the queen. The challenge was to provide an outlook on emerging policy challenges that simultaneously makes an interesting read, points to dilemmas, generates questions, and inspires public involvement.[9] Finally, the last phase involved the drafting of the final report and marked the start of an intense dialog on the results and their implications within and across government.

In sum, the Netherlands Horizon Scanning Project shows that a broad strategic scan provides valuable input for policy-making by identifying, assessing, and clustering future trends, issues, and developments [40, pp. 43–48]. The topics raised in the course of such a project will only be of sustained value, however, if they initiate a more comprehensive foresight process that transforms the identified knowledge (and the knowledge gaps) into insights for strategic decision-making.

3.4. Assessing the country reviews: product- and process-oriented foresight

The conceptual frame of strategic foresight as developed in the second chapter emphasized two contributions of foresight to public policy-making: first, it is an information-based approach to gather and document data and facts about relevant trends in an organization's external environments systematically; second, it serves as a driver of social learning processes that lead to the emergence of alternative policies.

Both functions can be identified in the country reviews of the UK, Singapore, and the Netherlands. First of all, all foresight programs lead to some tangible products: in the UK, the two horizon scans result in issue papers; the futures projects produce a project report on the topic under consideration as well as an action plan in view of implementing the policy recommendations; and the public outreach program – most notably the FAN Club – equally yields tangible outcomes. In Singapore, the government-wide information network entails the possibility of discovering and sharing as web services concrete data that have been fed in the system by the connected government agencies. Furthermore, novel concepts and technologies are tested in an operational context and may emerge as useful tools for facilitating public policy. Finally, the Dutch Horizon Scanning Project led to a series of smaller products over the different phases of the entire process, including a bibliography, a comprehensive list of threats and opportunities, a card game, essays on a variety of issues, an alternative "State of the Nation" address, and an edited volume that documents the whole project.

Such concrete benefits are crucial for the success of foresight activities. On the one hand, they give evidence of the work that was done, record some of the knowledge and the insights that were produced, and make them accessible for later use. On the other hand, products also help to legitimize the financial expenditures that are linked to foresight activities. If a "real" product, such as an issue paper or at least a workshop report, can be demonstrated, it may be easier to convince people in government and the broader public of the usefulness of such exercises and to win their support.

An in-depth analysis must conclude, however, that the most significant benefits of foresight lie in the second function: the learning processes initiated, the emerging shared understandings, and the networks created between individuals and organizations across policy areas within and beyond particular professional communities. Such intensified interactions among experts from different fields in government, business, academia, and civil society can be observed in all the reviewed foresight programs: in the UK, for example, the intensified interaction consists in the process of collaboratively selecting, designing, and executing futures projects, and in the broad public outreach to all those who have – for whatever reason – an interest in futures analysis; in Singapore, it is seen in the manifold formal and informal networks that emerge from technological efforts facilitating government collaboration, and in the active outreach to academia, the private sector, and international partners; and in the Netherlands, the horizon scanning project was all about initiating a process that brings together people of various provenance to jointly think about the future.

[9] The address was published in the daily newspaper NRC Handelsblad on 16 September 2006 [40, p. 36, see also the reprint on pp. 153–158].

4. Conclusions

The reviewed process underlines that strategic foresight is a multifaceted and flexible concept that can be adapted to an organization's particular needs and a country's political and cultural characteristics. Its overall success relies on three fundamental factors [6, p. 21f., 21, p. 5f., 42, p. 18f.]: the development of topical, methodical, and process expertise; the promotion of creativity and lateral thinking to generate new ideas and visions; and the ability to establish intense interactions among stakeholders and senior policy-makers to win credibility, trust, commitment, and support. The reviewed foresight programs show awareness of these requirements and underline some messages in terms of what is needed if foresight is to contribute effectively to public policy-making.

First, it is imperative to create an interoperable working environment under the responsibility of more than one department to pursue a holistic and broad policy perspective. Evidently, foresight that intends to cut across policy areas is challenged by the difficulties of hard-wiring different government agencies. Individual departments are usually protective of their own areas of responsibility, and even if an enthusiastic minister sponsors a futures project, it may not get support from colleagues elsewhere [33, p. 1702]. Cross-cutting foresight must therefore strive to find the right balance between centralization in terms of methodical and procedural support, and decentralization with respect to the topical expertise that is to be found in a variety of competent bodies across government.

Second, in today's dynamic environment, where the challenges transcend geographic and sectoral boundaries, even an inclusive cross-governmental process may not be sufficient anymore. Foresight must therefore be extended toward other professional communities, particularly private businesses, think-tanks, and the academic sector. A multi-stakeholder approach, drawing on a multitude of internal as well as external sources of knowledge, is preferable to a process that is exclusively centred on experts from within government. The public outreach programs of both the UK and Singapore strongly reaffirm this statement, and the recent trend towards linking several national programs in a joint horizon-scanning capacity signals that international cooperation might become more important in the future.

Third, it is essential to base foresight on the best available evidence in order to safeguard its credibility and the longer-term reputation of the program. This message is strongly emphasized by the British government, for instance, by entrusting the UK Foresight Programme to the responsibility of the Government's Chief Scientific Advisor as a way of guaranteeing that real expert knowledge flows into the project work. If foresight lacks analytical rigor, the trustworthiness of the results will be challenged, and it will become difficult to translate them into generally acknowledged policy recommendations.

Fourth, as foresight deliberately aims to challenge conventional wisdom and seeks insights on the margins of current thinking, the support from senior policy-makers is indispensable. The UK government states quite bluntly that if there is no one willing to listen, no scientific reports are needed. Consequently, researchers will only embark on the unexplored territory of a new project if the relevant stakeholders support them. If the reports are shelved without further action as soon as they are published, interest in such exercises will rapidly vanish not only in the government, but also among all other involved groups and individuals.

Strategic foresight therefore best unfolds its strengths if it integrates all three phases of the described process, is regularly repeated, and is solidly anchored at the institutional level. In this case, it is likely to win the support of the relevant stakeholders in parliament, government, the administration, and the general public as it may raise the government's strategic decision-making capabilities and thus has the chance to contribute effectively to the development and implementation of alternative public policies.

References

[1] J.S. Nye, The Paradox of American Power, Oxford University Press, Oxford, 2002.
[2] F.J. Aguilar, Scanning the Business Environment, McMillan, New York, 1967.
[3] I.H. Ansoff, Managing strategic surprise by response to weak signals, California Management Review 18 (2) (1975) 21–33.
[4] M.E. Porter, Competitive Strategy: Techniques for Analyzing Industries and Competitors, Free Press, New York, 1980.
[5] U. Krystek, G. Müller-Stewens, Frühaufklärung für Unternehmen: Identifikation und Handhabung zukünftiger Chancen und Bedrohungen, Schäffer-Poeschel, Stuttgart, 1993
[6] A.W. Müller, Strategic Foresight – Prozesse strategischer Trend- und Zukunftsforschung in Unternehmen, Dissertation Universität St. Gallen, 2008.
[7] C.W. Choo, Information Management for the Intelligent Organization: The Art of Scanning the Environment, Information Today, Medford, 2002.
[8] D. Brown, Horizon scanning and the business environment – the implications for risk management, BT Technology Journal 25 (1) (2007) 208–214.
[9] W.L. Schultz, The cultural contradictions of managing change: using horizon scanning in an evidence-based policy context, Foresight 8 (4) (2006) 3–12.
[10] A. Leigh, Thinking ahead: strategic foresight and government, Australian Journal of Public Administration 62 (2) (2003) 3–10.
[11] D.J. Boggs, When governments forecast, Futures (October) (1985) 435–439.
[12] C. Mareuge, Futures studies and public advisory work in Ireland, Foresight 8 (4) (2006) 55–61.
[13] S. Paillard, Futures studies and public decision in Sweden, Futures 38 (1) (2006) 67–73.
[14] B. Hérault, Public forecasting and futures studies in Germany, Foresight 8 (6) (2006) 71–77.
[15] I. Miles, UK foresight: three cycles on a highway, International Journal of Foresight and Innovation Policy 2 (1) (2005) 1–34.
[16] A. Colson, M. Corm, Futures studies in the European Union's new member states, Foresight 8 (3) (2006) 55–64.
[17] B. Hérault, Public futures studies: themes and variations, Foresight 8 (2) (2006) 57–69.
[18] O. DaCosta, P. Warnke, C. Cagnin, F. Scapolo, The impact of foresight on policy-making: insights from the FORLEARN mutual learning process, Technology Analysis and Strategic Management 20 (3) (2008) 369–387.
[19] ERANet, Developing European Horizon Scanning Cooperation: Preliminary Report on a Pilot Joint Activity, June 2007 revised version. http://www.toekomstverkennen.nl/doc/2007/3%20Preliminary%20report%20on%20joint%20pilot%20activity.pdf (accessed January 31, 2009).
[20] International Council for Science, Identification of Key Emerging Issues in Science and Society: An International Perspective on National Foresight Studies, Paris, 2002.

[21] Center for Science and Technology Studies, Foresight-Studien – Bestandesaufnahme in OECD- und ERA-Ländern (von Dirk Meissner, unter Mitwirkung von Diana Schramek), Bern, 2007. http://www.swtr.ch/d/ablage/dokstelle/Publikationen/2007/Foresight_Endbericht.pdf (accessed January 31, 2009).
[22] United Kingdom Ministry of Defence, The DCDC Global Strategic Trends Programme 2007–2036, 3rd ed., London, 2007. http://www.dcdc-strategictrends.org.uk/viewdoc.aspx?doc=1 (accessed January 31, 2009).
[23] Finnish Ministry of Defence, Securely into the Future – Ministry of Defence Strategy 2025, Helsinki, 2006. http://www.defmin.fi/index.phtml?l=en&s=318 (accessed January 31, 2009).
[24] E. Major, D. Asch, M. Cordey-Hayes, Foresight as a core competence, Futures 33 (2) (2001) 91–107.
[25] J. Voros, A generic foresight process framework, Foresight 5 (3) (2003) 10–21.
[26] A. Horton, A simple guide to successful foresight, Foresight 1 (1) (1999) 5–9.
[27] R.A. Slaughter, The Foresight Principle: Cultural Recovery in the 21st Century, Praeger, Westport, 1995.
[28] U. Krystek, G. Müller-Stewens, Strategische Frühaufklärung, in: D. Hahn, B. Taylor (Eds.), Strategische Unternehmensplanung – Strategische Unternehmensführung, 8th ed., Physica, Heidelberg, 1999, pp. 497–517.
[29] J.S. Nye, Peering into the future, Foreign Affairs 73 (4) (1994) 82–93.
[30] É. Hideg, Theory and practice in the field of foresight, Foresight 9 (6) (2007) 36–46.
[31] United Kingdom HM Treasury, Science and Innovation Investment Framework 2004–2014, London, 2004. http://www.hm-treasury.gov.uk/spending_sr04_science.htm (accessed January 31, 2009).
[32] United Kingdom, Guidelines on Scientific Analysis in Policy Making, London, 2005. http://www.berr.gov.uk/files/file9767.pdf (accessed January 31, 2009).
[33] D.A. King, S.M. Thomas, Taking science out of the box – foresight recast, Science 316 (5832) (2007) 1701f.
[34] United Kingdom Cabinet Office, 2002. Risk: Improving Government's Capability to Handle Risk and Uncertainty, Strategy Unit Report, London, November 2002. http://www.cabinetoffice.gov.uk/strategy/work_areas/risk.aspx (accessed January 31, 2009).
[35] Singapore National Security Coordination Secretariat, 1826 Days: A Diary of Resolve. Securing Singapore Since 9/11, SNP International Publishing, Singapore, 2006.
[36] Singapore National Security Coordination Centre, The Fight Against Terror: Singapore's National Security Strategy, Singapore, 2004. http://www.mindef.gov.sg/imindef/resources/e-books/ebklist.-imindefPars-0004-DownloadFile.tmp/FightAgainstTerror.pdf (accessed January 31, 2009).
[37] Singapore National Security Coordination Centre, Technical Paper on RAHS. RAHS Experimentation Centre, Singapore, 2007. http://www.rahs.org.sg/rahs%20publication/ICCRTSP/Technical_Paper_on_RAHS_(3_Jan_07).pdf (accessed January 31, 2009).
[38] Singapore National Security Coordination Secretariat, International Risk Assessment and Horizon Scanning Symposium 2007 (Symposium Report), Singapore, 2007. http://rahs.org.sg/t2_irahss07_sr.html (accessed January 31, 2009).
[39] S. Rajaratnam School of International Studies, 2nd Asia-Pacific Programme for Senior National Security Officers (Conference Report), Singapore, 2008. http://www.rsis.edu.sg/publications/conference_reports/APPSNO_08.pdf (accessed January 31, 2009).
[40] Commission for Consultation of Sector Councils, Horizon Scan Report 2007: Towards a Future Oriented Policy and Knowledge Agenda, The Hague, 2008. http://www.horizonscan.nl/uploads/File/COS_binnenwerk%20engels_06 (1).pdf (accessed January 31, 2009).
[41] R. In't Veld, H. van der Veen, F.M.R.C. Basten, Polar Bear Plague on the Veluwe: Essays on the Future, The Hague, 2006. English Summary of May 2008: http://www.horizonscan.nl/uploads/File/webversie%20Mini_ijsberenplaag_op_de_Veluwe_ENG_rev%20(4).pdf (accessed January 31, 2009).
[42] B. Van der Meulen, The impact of foresight on environmental science and technology policy in the Netherlands, Futures 31 (1) (1999) 7–23.