# How can Scanning for Foresight be Considered Effective in Addressing Complex Problems?

Foresight, a relatively new field sometimes referred to as strategic foresight, future studies or futurology, can be valuable for advancing the management of complex problems at various scales in a complex environment (Popper, 2008).[1] For example, foresight has been used for addressing global problems; communities have used it at a local scale and the United Nations has used it at a global scale (Bengston, 2013). This finding is very important to what seems to be a constant battle against a rising concern about complex global problems but it is not enough to know that foresight can be valuable. In consideration of competing scarce resources and pressing timelines for addressing complex challenges (Ramos, 2011), the extent to and the conditions under which foresight is effective needs to be well researched. Furthermore, whether there are opportunities to improve upon the ability to use foresight to generate better outcomes for managing complex problems should then be identified. However, before these steps can be achieved, it is first critical to understand the different processes and related methods that are used by foresight practitioners. As this is an emerging field, ambiguity from diverse definitions, evolving methodologies and different approaches can create confusion around the different elements of the practice of foresight (Georghiou, 2008).[2] This makes understanding foresight processes difficult but even more important.

"Strategic foresight is the ability to create and maintain a high-quality, coherent and functional forward view, and to use the insights arising in useful organisational ways." (Slaughter, 1999, p. 287). Three major areas of foresight are: scanning, scenarios and strategies (see Figure 1). This paper, the first in a series of three, will examine these foresight areas using an analytic process. It is important to recognize, however, that many of the methods used within foresight are in fact social processes, e.g., conflict resolution and engagement in dialogue.

Figure 1. A Simplified Representation of the Foresight Process

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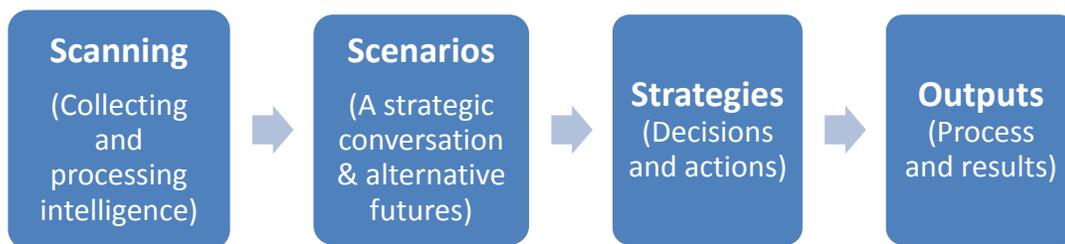
[1] Technically, foresight, and especially strategic foresight, is considered as having a greater focus on planning and decision-making than the general area of future studies (Keenan, Miles, & Kaivo-Oja, 2003)

[2] Foresight is also practiced differently in various regions of the world (European Union, European Commission, & Directorate-General for Research, 2009, p. 8).

The purpose of this document is to explain the first critical area, scanning, and explore how scanning could be considered effective as it is used specifically for the management of complex problems. I will begin by introducing foresight and then delve into what is involved in the scanning process. Finally, I will offer some thoughts on areas to examine in determining the effectiveness of scanning for addressing complex problems (also see Gregory, Harris, & Ogilvy, 1998; Hiltunen, 2010).

Foresight as a field offers value to society through the knowledge and concepts it has generated in working with the future; through its different worldview and through its application to several activities, e.g., innovation, planning, public engagement, and subject areas, e.g., health, nanotechnology, with the ability to address the current complex and turbulent environment (Wilkinson, Kupers, & Mangalagiu, 2013). The reason foresight has developed and continues to grow is that this value can provide society with the ability: to vision and plan for the future, identify images of a potential future and what it may hold, determine how these potential futures may affect society and how as a society we can anticipate and prepare for different potential futures or avoid them, assess how our current actions may affect the future and to help us adjust to a world to which we may increasingly become unfamiliar (Dator, 2007; Toffler, 1965; Schwartz, 1996; Wells, 1932). Furthermore, the additional benefits of foresight include but are not limited to the following outputs: preparing policy recommendations, fostering innovation, identifying research opportunities and advancing actions (Popper, 2008; Inayatullah, 2008). Of particular value for complex problems are the process-related outputs, such as, foresight's ability to incorporate diverse values, resolve conflicts, build cooperation, create new ways of thinking and deconstruct assumptions, enhance learning and develop shared values and interests among its participants.

Some key elements of what foresight practice includes and does not include helps to further explain the practice. First, foresight practitioners do not predict the future but rather systematically identify alternative forecasts or images of the future. This is critical as there has been a misconception that this practice's objective is to identify what is going to happen in the future. Second, foresight challenges the status quo and sometimes what seems realistic and builds on creativity and imagination. Next, working with the future is a dynamic ongoing process (Dator, 2007). Finally, the practice of the field is holistic and transdisciplinary; building on the knowledge and methods of other disciplines.

There are different ways of describing and grouping the methods involved in the foresight process. For example, an approach to categorize different methods by phases of foresight has been used by Miles (2002) and then Popper (2008), e.g., pre-foresight, action and renewal. Other ways in which methods and the foresight process have been explained include, but are not exclusive to: the types of methods used, e.g., qualitative, quantitative, mixed; exploratory or normative, e.g., answering objective versus desirable future questions; knowledge source of the information, e.g., evidence, interaction, creativity and expertise; and concepts, pillars and questions (see Inayatullah, 2008). A number of factors, such as resource availability, timeline, objectives, have been listed as variables that help define which methods are chosen for the project and how they are implemented. The foresight team influences the selection of methods through various factors such as their epistemology, experience, preference and

knowledge of methods.[3] The choice of methods and the way in which they are applied are very important but there is no one correct way to proceed with a project (Popper, 2008).

Scanning

What is scanning? The language around scanning is not always clear. Scanning, sometimes referred to as horizon scanning or environmental scanning, can refer to a process in which information is collected about changes in an environment. It can also include the processes of synthesis, analysis and communication of this information. Scanning is common in the field of management in which organizations try to be informed of the changes in their external environment. Scanning for foresight is different in that there is: a focus on trends and a longer future horizon as well as earlier signs of change, more comprehensive scanning, an examination of highly unlikely possibilities (Bengston, 2013), and at an organization level a desire to integrate systems so findings can result in action and a central process to use and link foresight methods to functional units (Rohrbeck & Bade, 2012). This type of scanning can be thought of as scanning adapted for the conditions of increasing complexity in which expedience and greater awareness of what's happening in the external environment is becoming more important.

Scanning for foresight is important because it can provide basic and interpreted information about the area studied and related trends (Choo, 2002; Inayatullah, 2008); help society anticipate the future, plan and act on this information in a timely manner (Molitor, 1977); and, contribute to a culture of continuous learning and readiness for change (Bengston, 2013). Incorporated within these benefits of scanning, and defined by the overall scanning technique and how specific methods are used, are the social processes that can take place during a scanning for foresight exercise, e.g., the outputs of the interactions between the actors involved (Hiltunen, 2010). Knowledge of our surroundings and how we fit into these surroundings on an ongoing basis is fundamental to basic awareness and action (Inayatullah, 2008). However, the changes in, e.g., attitudes, beliefs and behaviors, that can occur through dynamic relationships and social activities involved in some approaches to scanning can be a fundamental result. Scanning can make the difference between the success and failure of an organization or community.
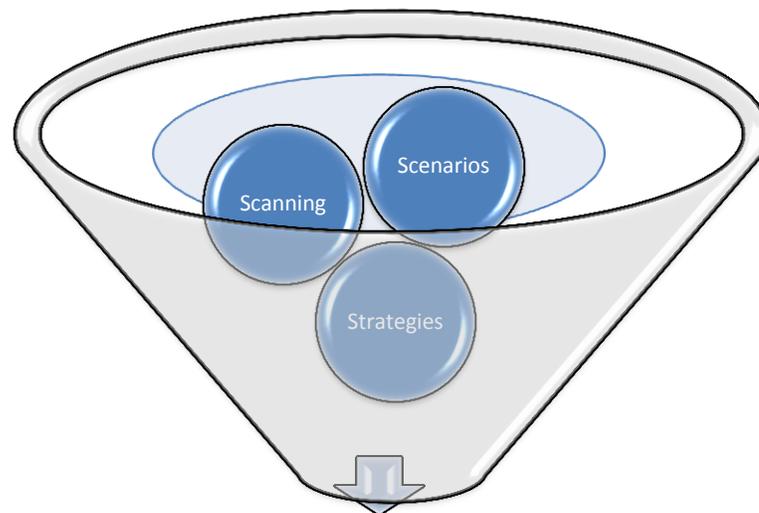
Before proceeding with a specific scanning project an organization may wish to make or assess practical decisions concerning the broader implementation of scanning as an ongoing organizational activity: who completes the scanning process, how often and for what time horizon. For instance, an organization has choices to complete scanning internally, through an internal team in conjunction with a network, contract an external firm or choose a variation of these options. Another example is that scanning can be a critical ongoing activity or completed less often depending on the organization's need for the information and the turbulence of the industrial context. In this case, a combination of scanning and monitoring (similar to scanning but different in that it focuses on tracking only a few specific early indicators or weak signals identified previously in the broader scanning process) may be used. Finally, the time horizon can be broken up into periods that make sense to the organization. Some general recommendations have already been made to design better ways in which to generally conduct scanning for foresight activity: e.g., both broad and focused scanning are important, and diversity is important

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[3] Expert advisors and/or sponsors may also be involved in scoping the project (Popper, 2008).

in terms of the scanning team, the information sources accessed and the way in which the scanning results are communicated (Bengston, 2013).

As is the case for foresight, the technique or approach used for scanning for foresight depends on the foresight team and the objectives, timelines and other variables that help scope out the foresight project. A few examples are provided to explain the different ways in which scanning can be used. Scanning can be composed of one foresight method, e.g., a literature review, or a group of methods, e.g., panels, literature reviews, and SWOT analysis. The depth of each method can also vary, e.g., data collection from literature review can be extensive or limited by, e.g., number of years, sources and terms. The scanning process, as it is determined, can take place at any time during a foresight project. For instance, scanning may be conducted to scope out the project and choose the methodology; it may be used again to explore the topic in greater depth to inform panels or to gather further information in order to take action (Popper, 2008). Popper (2008) outlines different approaches, as per combination or order of methods that may be used depending on the objectives of the project, i.e., building cooperation, facilitating competition or producing visions of the future. Bengston (2013) also outlines two conceptual models of scanning systems and methods used to improve scanning. A different approach is posited by Inayatullah (2008) that includes multiple stakeholder perspectives as well as a deeper level of examination of their mental models of the future. Finally, see Figure 2 for a revised depiction of a more complex foresight process. "The scanning process, with context provided by scenarios, can bring into prominence other unusual events that may appear at first in our peripheral vision…" (Gregory, Harris, & Ogilvy, 1998, p. 5).

Figure 2. A Complex Representation of the Foresight Process

Methods used for scanning are numerous. Procedures used for gathering information and perspectives include a number of informal and open activities, such as talking to people, skimming printed material and exposing yourself to new experiences, as well as several more formal and systematic methods, such as conducting literature reviews, surveys, benchmarking, and bibliometric analysis (Bhimji, 2009; Popper, 2008). Fundamentally, this step of scanning

requires an open mind, curiosity, an ability to organize, and the skill to keep focused (Shwartz, 1996). Additionally, it also helps to know what to look for, e.g., looking for wild cards, broad scanning for emerging trends through volumes of material or being able to anticipate a change in public policy (Molitor, 1977; Schwartz, 1996), and to have the technical expertise to use some of the more sophisticated methods. Several specific tools are also available to aid in a likely second step of scanning; organizing and analysing the information acquired. A sample includes the futures wheel, STEEP, futures triangle, trend and driver analysis, causal layered analysis, system maps, cross-impact analysis, impact likelihood, scenarios, issues trees, and expert panels (Bengston, 2013; Bhimji, 2009; Inayatullah, 2008; Popper, 2008).

With all of these tools, methods and approaches listed above in what ways can scanning be considered as more effective in certain circumstances than others? First, the implementation of scanning is not trouble free. Broad implementation factors of an organizational scanning system or a one-off scanning project can have a significant impact on the results of scanning. To illustrate, basic issues arise from factors such as lack of: resources, management support, appropriate participation, open thinking and foresight knowledge or experience (Lesca & Caron-Fasan, 2008). Even then, scanning is not an easy task (Bengston, 2013).

Second, certain approaches to scanning may be more effective than others (Bengston, 2013). Approaches can be distinguished in various ways, e.g., use of a participatory or other type of approach that has a particular focus, selection of certain methods or the way in which methods are combined. There are ways in which scanning approaches are already being improved; namely through the use of new technology and social media. A key benefit of the digital age allows for more efficient use of resources and, thus, more available resources to scan the horizon. This also opens up the possibility for greater breadth and depth of scanning and, because less resources are required, for more organizations and individuals to perform scanning. Other benefits may include facilitating diversity and creativity in the scanning process as a whole and in the use of particular methods, e.g., literature reviews. Improving individual methods, or in other words, sharpening the toolset is a third way in which scanning can potentially be more effective. Linking to related literature and practices in other disciplines is likely to provide assistance in identifying prospective improvements (Rohrbeck & Bade, 2012). Digital scanning methods include, for example, the use of the Internet and databases for MetaScanning (scanning resources already compiled by others)[4], webcrawlers, RSS feeds, listservs, blogs, and other online social methods (Bengston, 2013).

Although improvements to scanning can be made in general, the degree of effectiveness of these as well as other improvements and the specific conditions under which better results are most likely to be observed has to be determined through assessing practices. Not all improvements actually result in more effective scanning, or are effective to the same degree under a range of diverse conditions. Therefore, improvements in scanning for foresight in general can potentially be more effective in certain circumstances. This provides the final way (as explored in this paper, not excluding other possibilities) in which scanning can be more effective: by tailoring scanning to the context in which it is being conducted. This will be

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[4] MetaScan is also the signature report produced annually by Policy Horizons Canada.

discussed in greater detail in the section below; how could foresight and scanning be more effective in addressing complex problems?

Foresight & Scanning as Used for Addressing Complex Problems

Guidelines for ways in which foresight can be best used for different contexts and purposes can be important for outcomes. Using guidelines rather than prescriptions is imperative to not limit the creativity or 'art' in the foresight process, provide for the uniqueness of each foresight project and for foresight to maintain the ability to be flexible in a complex system (Bhimji, 2009; Gregory, Harris, & Ogilvy, 1998). As mentioned earlier, the approach, selection of methods used for a foresight project and how the methods are used are critical for success (Popper, 2008). In addition to tailoring the foresight approach for a particular project, foresight processes in general tend to be studied and applied differently depending on contextual categories, e.g., business – corporate foresight, technical innovation – technical foresight, strategic planning – strategic foresight, and environment - environmental foresight. Thus, it seems that foresight practice may be more effective if taking into consideration the context in which it is practiced by assessing for and tailoring foresight practice to the contextual category and overall purpose of the project, e.g., improving innovation or generating organizational competitiveness in businesses and addressing public policy challenges in the environmental sector. As such, foresight may be more effective in addressing complex problems if it is tailored. Furthermore, foresight effectiveness can be assessed through linking the knowledge acquired from this process to literature and methods used in other disciplines related to complex challenges (Rohrbeck & Bade, 2012; Molitor, 1977).

Similarly, scanning used to specifically address complex problems can be more effective if it is tailored to one or more contextual factors, e.g., complexity, global progress, type and location of the problem, and social environment; and by linking to other disciplines and their applied methods, such as organizational, business and policy studies (Rohrbeck & Bade, 2012; Molitor, 1977). For instance, global progress measures could potentially be used to help assess and frame the status of complex problems. Alternatively, there may be certain success factors in including community members on expert panels to interpret data on fresh water shortages in the developing world or there may be certain types of information that should be collected to address whether community members should be included. By drawing lessons from context and other disciplines key mitigating factors for addressing specific complex challenges can also be identified, e.g., multi stakeholder participation and dialogue, addressing multiple perspectives, cross sector collaboration, data sharing and governance issues. The scanning process can then be further tailored (Amanatidou, 2014). Thus, assessing the ways in which the scanning approach for addressing complex problems can be considered effective and the ways in which effectiveness may be improved is important.

A few examples follow to illustrate the ways in which scanning could potentially be tailored and assessed in its impact on addressing complex problems. For example, the effort and methods assigned to understanding the history of a complex problem could be more clearly outlined. The ways in which scanning currently is employed in addressing complex challenges and the effectiveness of these approaches could be better understood and assessed. Additional questions can include the following. What impact does the process-related outputs have on managing complex problems? How is scanning aligned with key mitigating factors? What extent

of public engagement is ideal for scanning and how should this be facilitated? What are the concerns with public engagement and how can they best be addressed? How much effort should be expended on understanding different stakeholder perspectives? How should complex problems be framed? Can scanning processes be linked with other non-foresight processes to create a more effective use of resources? How does culture affect the selection and use of methods for scanning? More research addressing these types of questions, including testing different approaches to identify which methods are more appropriate for different circumstances and which approaches provide better results in meeting objectives and improving outcomes could help improve scanning.

Conclusion

This paper provided an overview of foresight and scanning for foresight in order to explore the possibility of how scanning could be considered effective as it is used to address complex problems. Although foresight is not the only or the major approach used to address complex problems, it is a part of an overall process in which its role needs to be identified. Scanning for foresight can potentially be improved through: digital media, addressing elements of its implementation and refining the approach and toolset. However, what this translates to in terms of the degree of scanning's effectiveness and improved outcomes for addressing complex problems needs to be determined. Both foresight and the scanning area within foresight can be tailored to address complex problems by creating better linkages to other disciplines and the pertinent context in which complex problems occur generally and specifically. Further, key mitigating factors can be identified, and then addressed through the scanning approach.

As this document is exploratory, the thoughts in this paper need to be developed further through a broader literature review, a conceptual framework and in-depth analysis. Then, empirical research will be critical in providing evidence as to which practices for scanning may be more effective. Generating a typology of the different kinds of foresight approaches used in practice would be helpful. More research can also examine how problems and solutions are being conceptualized and then addressed in foresight practice. Additionally, identifying the state of scanning practice, such as, who conducts scanning activities, what do they do and how, would further enrich this work. It would also illuminate whether there are ways in which the impact of scanning is affected by the way the practice is carried out, e.g., inherent team work or organizational issues.

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