**INTRODUCTION TO HORIZON SCANNING**

**by Simon Moss**

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| **Introduction** |

Horizon scanning is a suite or sequence of methods that enable individuals or organizations to develop plans that could accommodate possible changes in the future. For example, after researchers conduct horizon scanning, they might foresee the possibility that some existing technology, such as laptops, might become obsolete in the future. They would therefore need to develop plans that accommodate this possibility. Specifically, horizon scanning is designed to delineate

* possible futures
* probable futures
* preferable futures, and
* wildcards—defined as unlikely, but possible, events that could be very consequential

The key aim of horizon scanning is to develop plans that may accommodate impending problems or utilize impending opportunities. For example, horizon scanning is often applied to identify embryonic advances or possible trends before these developments pervade the market. In short, horizon scanning is an attempt to utilize possibilities in the future to inform ongoing plans.

**Overview**

 In essence, horizon scanning integrates a variety of techniques into a unified sequence. Researchers and practitioners have yet to reach consensus on a particular sequence. That is, every researcher utilises a unique blend of methods to conduct horizon scanning. However, the following table illustrates six main phases and the main activities that correspond to each phase—together with some examples. These examples revolve around how the nature of PhDs might transform in the future.

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| Activities | Examples |
| Phase 1: Clarify the need or problem |  |
| Determine the purpose of this research. For example, the purpose of this horizon scan might be to inform strategies or policies, invest in suitable technologies, engage the public, and so forth.  | * The purpose of this horizon scan is to contemplate how to respond to some potential transformations of the PhD program in Australia
* The scan is merely intended to uncover reasonable possibilities and improve plans.
* Many researchers want to unearth scan hits, defined as early and subtle indicators of some change or transformation. But, in practice, these hits are hard to unearth.
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| Ascertain whether the relevant stakeholders share this purpose and support this scan | * The stakeholders outside the university—such as TESQA, Universities Australia, the Union, and student associations—have agreed to contribute
* The stakeholders within the university—such as the research office and executives—have also agreed to contribute or fund this project
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| Determine whether you can access the resources and time you need to complete the scan appropriately | * The DVC-RI would like the project team to complete a report by June 2020
* The funding should be sufficient to employ two research assistants, full time, until June 2020—enough to complete the scan on time
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| Phase 2: Specify the participants |  |
| Clarify who will participate in this scan—such as who will be interviewed. Embrace, rather than avoid, participants who could suggest unpleasant possibilities and differ appreciably from the team.  | * The team will interview specialists in workplace development, former Deans of Graduate Studies, futurists, investors, and executives of the peak body: the Australian Council of Graduate Research,
* The team will also interview informed individuals at the university
* Other experts, authorities, decision makers, and stakeholders may be identified later
* In particular, the team will seek individuals who tend to influence public opinion on this topic or similar topics
* Initially, the team will contact a diversity of individuals. As the project evolves, however, the team will confine their efforts to a subset of the most informative participants
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| Phase 3: Collect the data |  |
| Besides discussions with participants, specify other possible sources of data | **Desk top research*** The team will conduct desktop research—that is, derive information from their computer, such as the internet, social media, databases, and journals
* Specifically, many sources of data will be considered, such as databases of scientific literature, patent applications, and clinical trials.
* In addition, the team will summarize the results of horizon scanning that were conducted by international regulators and committees, such as the OECD and EuroScan
* Google Trends and Google News Timeline may also be utilized to uncover data about trends and shifts over time
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| Specify criteria to decide which sources of information are most important—sometimes called filtration | * The team will prioritize data that is not too costly to access
* The team will also prioritize trends that are supported by empirical data, such as time series,
* Nevertheless, information that, at first, seems unusual will be retained rather than dismissed prematurely
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| Decide how you will collect the data and information—such as the interview questions or search criteria | * To collect data, the team will convene interviews, organize workshops, conduct surveys, and utilize conferences or meetings
* For example, all the presentations at a relevant conference, called “the future of higher education”, will be included in the analysis.
* Individuals will be asked to consider some of the opportunities and obstacles that affect the PhD program—and how these opportunities and obstacles could transform this course in the future
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| Phase 4: Analysis |  |
| Determine which methods you will use to aggregate or classify the data initially | * This team will use PESTLE: Political, Economic, Social, Technological, Legal and Environmental
* That is, the team will consider how the collected data corresponds to these six categories
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| Determine which methods you will use to analyse the data—and in particular identify emerging problems and emerging solutions | * This team will apply a series of techniques to clarify the potential problems and solutions in the future, such as scenario planning and the Delphi method
* Some of these methods are discussed later in this document.
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| Apply methods that are designed to overcome biases | * Be mindful of the possibility that people tend to focus inordinately on more immediate change rather than future events
* Thus, underscore trends and changes that might unfold ten or more years from now
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| Communication |  |
| Consider how you will manage private and sensitive information | * Include a disclaimer that such descriptions of the future are not predictions but possibilities that could inform upcoming decisions and priorities
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| Determine how you will communicate the information as effectively as possible | * The report will be divided into short excerpts—and these excerpts will appear in social media
* The information will be presented at the Australian Council of Graduate Research conference
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| Decide when to promulgate this information—depending on the preferences of stakeholders and the stage of this decision-making process, such as the budget cycle | * The information will be presented to the Board of Graduate Studies early in the year—at a time when strategies tend to be updated.
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| Influence |  |
| Consider how to utilize these reports to influence relevant decisions |  |
| Determine how you will measure the success of this horizon scan |  |

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| **Methods to analyse and understand data** |

 To apply horizon scans effectively, researchers need to reduce mounds of data into some key themes and insights. The following table presents some techniques that researchers often apply to complete this task—a phase that is collectively called analysis. In practice, researchers can use a variety of techniques to achieve this goal, such as trend extrapolation, causal layered analysis, Delphi methods, as well as growth curves, time series analysis, and other statistical techniques.

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| Technique | Details |
| **Cross-impact analysis.** This set of techniques is designed to predict how a set of possible events and activities might affect each other to influence other variables and ultimately shape the future.  | * First, the researcher identifies four to ten events that could affect the circumstance that individuals might want to predict. To illustrate, the rise of China is an event that could affect PhD degrees in the future.
* Second, the researcher attempts to estimate the probability of each event, often by consulting experts, analogous to the Delphi method
* Third, the researcher estimates the probability of each event—such as Event A—if another event did transpire—such as Event B, also by consulting experts
* Fourth, the researcher utilizes simulations to assess these probabilities, primarily to preclude contradictions. Computer software is sometimes needed to conduct these simulations
* Finally, the researcher conducts analysis to predict future scenarios
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| **Morphological Analysis**. Researchers subdivide solutions or initiatives into elements, arranges elements into a matrix, and then changes one element at a time—or combines these elements—to improve efficiency. This technique is suitable whenever individuals want to solve complex problems that cannot be readily quantified | * First, the researchers clarify the problem they need to analyze or solve, such as how to improve the utility of PhD degrees
* Second, the researchers identify and clarify the relevant issues or parameters, such as training, internships, mentoring, and so forth
* Third, for each of these parameters, the researchers identify the components or elements. Mentoring, for example, entails advice about research, the discipline, the industry, and networks.
* Fourth, the researcher constructs a series of grid or matrices in which the elements of one parameter are plotted against the elements of another parameter.
* Fifth, researchers utilize this grid to combine various elements
* Sixth, researchers decide which combinations of elements may be helpful and novel in the future.
* For an example and demonstration, see http://www.swemorph.com/ma.html
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| **Relevance tree.** Researchers construct a hierarchy that subdivides a broader topic into more specific subtopics. Hence, this map presents all possible pathways to reach some objective. This information can be used to forecast the likelihood, duration, or costs of some outcome. The relevance tree can also establish the most feasible or optimal set of actions, or solution, to reach this outcome | * Begin with the overall topic, goal, or outcome—such as how to improve the PhD program. Then, identify subtopics, subgoals, or activities. Continue to divide these subtopics, subgoals, or activities further
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| **Scenario planning.** Researchers uncover possible scenarios that might unfold in the future and then discuss how to accommodate these possibilities | * 1 Identify which drivers are most likely to shape the future of interest—more than 10 years in the future. This horizon over 10 or more years prevents individuals from merely extrapolating from existing trends. To identify these drivers, individuals often collaborate in a brain-storming session in which they transcribe relevant issues on Post-it notes and then attach these Post-it notes to walls.
* 2 Develop a rough model to characterize how these various drivers are related to each other. In particular, rearrange the Post-it notes, shifting similar drivers and topics closer together to uncover about 5 to 10 clusters.
* 3 For each cluster, blend or integrate the drivers. As you attempt to uncover the underlying theme or shared feature of each cluster, a mini-scenario will tend to surface. That is, you will unearth 5 to 10 possible scenarios of the future
* 4 Reduce these 5 to 10 mini-scenarios to 2 to 3 larger scenarios. That is, merge some of the previous clusters. If possible, identify scenarios that complement each other—such as an optimistic scenario and pessimistic scenario
* 5 Write the scenarios. That is, construct a narrative that describes the two or three scenarios as vividly as possible. You can describe characters, develop lists, or utilize any helpful device.
* 6 Consider the implications of each scenario. What is the effect of each scenario on the organization, for example? How can the organization manage these effects?
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| **Key principles** |

 Horizon scanning is sometimes called organisational early warning, environmental scanning, or even business intelligence, although these terms are not strictly interchangeable because they evolved from different fields. When researchers conduct horizon scanning, they tend to embrace a set of principles. Specifically, horizon scanning

* comprises a sequence of rigorous activities rather than merely a reliance on common sense. Nevertheless, intuition and common sense shape many of the responses
* transcends the established trends to consider possibilities that are not really understood
* prioritizes immediate action in response to possible events in the future; thus horizon scanning is not only oriented to the future
* is sensitive to weak signals—subtle predictors of future changes; researchers prioritize these signals even though evidence of these future changes is limited
* considers both gradual trends and the prospect of sudden shifts to characterize future possibilities
* tends to prioritize active scanning—proactive searching, analyzing, and assessing developments—rather than passive scanning—an emphasis on traditional alerts, such as industry journals. Passive scanning tends to reinforce, rather than challenge, the prevailing assumptions in the industry

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