

Future Demand

Insights into the scenario planning methodology

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Ministry of **Transport**
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This report has been produced as part of the Ministry of Transport's Future Demand project. The report captures the results of a brief review of academic literature and international experiences of scenario planning. In recognising the field of futures studies and scenario planning is well documented, this report stands at a high level and does not attempt to fully reflect the detailed discussions and debates captured in existing scenario planning literature.

This paper is presented not as policy, but with a view to inform and stimulate wider debate.

Summary

The appeal of scenario planning as a strategic tool has grown immensely from early beginnings during the 1970s. Since then, organisations have used scenarios to help plan their futures with greater confidence, acknowledging the high level of future uncertainty. As there are different purposes for applying scenario planning, there are also several different approaches to developing scenarios . While the evolution of scenario planning continues, lessons learnt from academic debate and practical experiences of scenario planning have strengthened the scenario planning methodology as a futures technique that openly challenges taken-for-granted assumptions when planning for the future.

Introduction

Scenario planning is a methodology employed to examine plausible, divergent futures based on uncertainty about drivers of change. This examination allows individuals and organisations to develop their capability and capacity to make robust decisions. Scenario planning is grounded in a qualitative approach that stands in contrast to quantitative forecasting tools that consider predicted futures.

Since early pioneering of the methodology by Royal Dutch Shell and the RAND Corporation, scenario planning has become a widely used strategic tool for many organisations globally. The growth in popularity of the methodology has created a large amount of academic attention over the past 40 years. This attention has aimed to establish the methodology as a viable strategic tool with practical applications for business and government, amongst others. Attention has also centred on providing suggestions or recommendations for improvements to the method, which has often been criticised on rigour and reliability grounds.

This report reviews and captures insights into the scenario planning methodology¹. It begins by exploring why scenario planning has grown in prominence and how it can be useful for organisations. The report then focuses on debated methodological issues of scenario planning, including the use of different frameworks for building scenarios, quantitative and qualitative scenarios, shocks in scenarios and lessons learnt from international experience of scenario planning.

¹ The report's purpose is not to provide a full explanation of the scenario planning methodology but rather to examine the issues that surround the methodology and its application. For an accessible overview of scenario planning please see www.journalofaccountancy.com/Issues/2011/Mar/20103483.htm or http://en.wikipedia.org/wiki/Scenario_planning. To view the outcome of an extensive previous scenario planning exercise for transport futures, please see www.gov.uk/government/publications/intelligent-infrastructure-futures

The strength of scenario planning

“The future does not lie at the end of a trend line”

Oliver Freeman, 2009

The appeal of scenario planning as a strategic tool has grown immensely from its early beginnings during the 1970s. Since then, business and government have recognised the power of scenario planning — which examines plausibility and possibility — to address some key shortcomings of traditional forecasting or prediction techniques. Freeman (2009) neatly explains the method of scenario planning as being “anchored in creativity and intuition” with the purpose of “discovering potential future environments in order to understand how today’s strategic decisions will have an impact on an organization in times to come” (Freeman, 2009, p.1). Freeman’s insights suggest the key strength of the methodology lies in discovery of potential or possible futures, including how decisions today could play out in years ahead. The ultimate goal of scenario planning should, therefore, be to build flexibility into decision making.

Scenario planning has traditionally been seen as useful for identifying threats and opportunities in the future. Rasmus (2011) explains that “organizations may not be able to discern or predict the exact nature of a threat or an opportunity, but they will be better positioned to navigate the eventual outcome if they have considered an uncertainty from multiple perspectives rather than taking the word of one pundit, or the extrapolation of one trend line as the most probable future while discounting other perspectives” (para. 6). In this respect, scenario planning has been described as an alternative to forecasting, which tends to conceal uncertainty in trends. A more accurate description would be to pitch scenario planning as a complement to forecasting, as it can broaden the range of possibilities from the high, medium and lower bounds of traditional forecasting techniques. By recognising uncertainty and testing for resilience using scenario planning, organisations today can plan with much greater confidence within dynamic external environments.

Approaches to scenario planning

As Godet highlights; “there is no single approach regarding scenarios” (Godet, 2009, p. 11). While this could be considered a weakness of the methodology as there is no ‘prescribed’ approach, flexibility of scenario planning allows it to be applied to many disciplines and tailored to individual organisations. Different organisations may see the value of scenario planning from different perspectives. As suggested by van Notten (2003), typically scenario studies have two principal purposes: exploration; and pre-policy research.

Exploration scenarios are primarily concerned with “learning, awareness-raising, the stimulation of creative thinking and investigating the interaction of societal processes” (van Notten, 2003, p. 5). Meanwhile pre-policy research “may propose concrete options for strategic decision-making and it is common in pre-policy research scenario exercises to offer implicit policy recommendations” (van Notten, 2003, p. 5). As the scenario literature has developed, numerous terms similar to van Notten’s

exploration and pre-policy research have emerged². In general, these terms can be placed under two purpose categories:

- ▶ Scenario exercises designed to lift strategic capability and strategic thinking (links to exploration scenarios).
- ▶ Scenario exercises to identify common trends, themes and responses for an organisation (links to pre-policy research scenarios).

Scenarios can be used to lift strategic capability and thinking

The purpose of strategic capability or exploration scenarios is for members of organisations or sectors to engage in learning and communication about the way they could be affected or shaped, depending on the way the world, or their operating environment, could develop. The ultimate goal of this type of scenario design is to shift organisations from 'day-to-day' thinking towards understanding longer term uncertainties about their operating environment.

Amer, Daim, and Jetter (2013) suggest strategic learning scenarios such as exploration scenarios are based on a complex set of relationships among economic, political, technological, social, resource, and environmental factors. As such, scenario planning helps to overcome 'thinking limitations' to help organisations prepare for multiple futures to instil flexibility and innovation (Amer, Daim, and Jetter, 2013). Grunwald's (2011) energy futures scenarios suggest decision makers face a difficult task in preparing for distant technologies and infrastructure but that scenarios play a strong role in influencing social thinking, decision making and initiating public debate.

Scenarios can be used to identify common trends and themes (and associated responses)

Another category of scenario planning evident in the literature is concerned with identifying common themes across scenarios, which aligns with van Notten's (2003) 'pre-policy research' scenarios. These types of scenarios are not divorced from exploration scenarios, in that to produce the scenarios extensive dialogue with key stakeholders is undertaken. However, the resulting scenarios themselves become the focus of strategic responses. Scenario narratives can be used to identify common trends or themes that are consistent across different scenarios and so enable an organisation to prepare its future by building flexibility into decision making. Back-casting is a method often used in these types of scenario exercises to identify how the trends or themes play out over time to get to where they are in the scenarios. Back-casting can help organisations identify signals or 'seeds' that indicate progression towards a scenario from the present, or it can help to identify a desirable position to aspire to and the steps needed to get there.

In practice, many scenario planning exercises employ a combination of both exploration and pre-policy research scenario exercises to lift strategic capability and to identify common themes and responses. This is because they are mutually reinforcing and both important for ongoing discussion about the future.

² See Grunwald (2011) for output, input and context oriented approaches.

An example of the fusion between the two types of scenario exercises comes from the World Economic Forum's (2014) *Scenarios for Mongolia*, which provided three different directions for the country given its mineral wealth and geographic positioning regarding surrounding superpowers. The World Economic Forum used the scenarios to develop 'common policy options' that would be robust under all scenarios, and policy options specific to each of the scenarios. The scenario exercise stimulated strategic discussions among the country's leaders and was designed to be a continuing point of discussion into the future. In this way, the World Economic Forum's scenario exercise had the dual purpose of stimulating strategic thinking and discussion while at the same time identifying common responses to the scenario pathways.

Scenarios can be built in different ways

Scenario planning exercises generally follow a process of developing a central question to answer, identifying uncertainties and key variables to explore in the future, and providing implications based on the central question. However, as highlighted earlier, there is no one or right way to create scenarios. Commonly used frameworks are evident across the scenario planning literature, but also a large number of techniques exist to build them. Bishop, Hines, and Collins (2007) provide an excellent overview of eight categories of scenario-building techniques: judgement, baseline/expected, elaboration, event sequences, back-casting, dimensions of uncertainty, cross impact analysis and modelling. While acknowledging the large number of different methodologies for building scenarios, the dimensions of uncertainty approach (also known as the Global Business Network approach) has become "the gold standard of corporate scenario generation" (Millet, 2003, p. 18 as cited in Bishop, Hines, and Collins, 2007). This technique incorporates two types of scenario matrixes, which are described below.

The dimensions of uncertainty approach to building scenarios

The two-by-two matrix (four quadrants)

The two-by-two matrix is the most commonly used framework in the dimensions of uncertainty approach to scenario planning. Scenarios are developed based on the shortlisting of two uncertainties from a wider set of environmental elements or drivers. Scenarios are developed in each of the four quadrants, representing two high impact and highly uncertain factors, and four ways they could play out. The two-by-two matrix approach allows detailed exploration of two critical uncertainties that can guide understanding of how they could play out in the future.

A criticism of the two-by-two matrix approach is that the matrix provides the only context for narrative writing; there are many possible narratives in each quadrant and this technique struggles to provide direction to the author where there is limited structure to describe how the scenarios could play out. Similarly, the technique is open to interpretation regarding the compatibility of the resulting scenarios (see Ramirez and Wilkinson, 2013).

The Wilson matrix

A Wilson matrix is a slightly modified two-by-two approach where the most uncertain and important factors are prioritised or ranked as high, medium or low to enable scenarios to be based on the two most critical uncertainties. The strength of the Wilson matrix is that it addresses a weakness of the two-by-two matrix approach by capturing the medium or low priority factors to ensure they are not lost. The lower priority factors are incorporated into the scenarios by becoming the basis of the scenario narrative structure, acknowledging their smaller degree of priority but their potential influence on the high priority factors. A Wilson matrix, as with a two-by-two matrix, ranks all factors against two dimensions: potential impact and probability that the trend/factor will develop into a significant issue. Unfortunately the Wilson matrix also suffers a similar issue as a two-by-two matrix in that it is open to interpretation as to which factors are regarded as high priority, and which two uncertainties are considered the most important among a long list of uncertain factors.

Quantitative versus qualitative approaches to scenario planning

From its earliest inception, a tension between the use of qualitative and quantitative techniques has been present in futures studies (Kemp-Benedict, 2004). Traditional forecasting approaches that are usually associated with quantitative techniques are based on assumptions that tomorrow's world will be much like today's, so where forecasts fail is when major shifts in the environment occur (Huss and Honton, 1987). As Kemp-Benedict (2004) highlights, quantitative modellers have cast themselves as the "guardians of rigor in a field [futures studies] struggling to gain legitimacy" (p. 1).

Common quantitative techniques used in futures studies include those from the school of 'probabilistic modified trends', which incorporates two methods: 'trend impact analysis' and 'cross-impact analysis' (see Bradfield et al., 2005 for coverage of these methods). Both methods use past and current trend data to extrapolate their likelihood of occurring in the future and their potential impacts. These methods also consider the effects of unprecedented events in the future, including how impacts of such events can swing trends in different directions. These techniques increase the breadth of possible futures and provide the user choice as to which would suit their organisation (depending on their purpose). However, it is the extension of current trends and assumptions on the continued interplay of underlying relationships that is a highly cited criticism of quantitative techniques such as trend impact analyses and some forms of modelling³.

Use of both qualitative and quantitative techniques in futures studies can be a strength. As van Notten (2003) suggests, "a quantitative scenario may be enriched and its communicability enhanced through qualitative information; a qualitative scenario may be tested for plausibility through quantified information" (p. 14). Data can 'speak' to some people more than words can and vice versa. Yet, the fusion of quantitative and qualitative data remains a methodological challenge (van Notten, 2003). Generally, purely quantitative techniques are considered useful for narrowly focused projects that have a short time horizon because of their reliance on present trends.

Amer, Daim, and Jetter (2013) suggest qualitative techniques are considered appropriate for projects

³ See Shoemaker (1995) for further shortcomings in quantitative scenario techniques.

that have large scope and a long time horizon, as qualitative methods are more malleable to highly uncertain future trends. Because of the limitations of purely quantitative techniques, futures studies have evolved from a quantitative approach (in the 1970s) toward a more qualitative one, embodied by scenario planning. Despite using various tools to aid scenario development, such as the inclusion of quantitative techniques as part of scenario planning (eg, Chatterjee and Gordon, 2006), scenario planning is still a highly subjective art and scenarios remain qualitative in nature (Martino, 2003).

Should shocks be included in scenarios?

The introduction of shocks or wildcards into scenarios can add an extra layer of complexity to scenarios, as shocks are inherently uncertain even in business environments that are more stable than others. Nevertheless, in his review of scenario typologies, van Notten (2003) found scenario exercises can successfully produce a set of gradual transformation scenarios with elements of shocks (see van Notten, 2003, for an example from the World Business Council for Sustainable Development).

Given that scenarios can be used to identify threats and opportunities, the incorporation of shocks into scenarios can be a useful exercise if the shocks are specific to an organisation and/or its operating environment. Highly probable shocks can be considered in scenarios where a key threat to an organisation or industry is real and it is through the exploration of the effects of a key shock that an organisation is able to produce more resilient strategies.

Scenarios are typically used to examine long-term changes rather than the immediate impact of shocks. Nevertheless, scenarios can be explored with the aim of developing resilience to future shocks. The risk with using non-specific shocks, in particular ones the organisation cannot control, is that scenario responses can be skewed towards taking account of these highly unlikely or difficult-to-predict shocks such as earthquakes or volcanic activity. Furthermore, the stress created within organisations by examining these shocks can overshadow the purpose of scenario planning, which is to build strategic capability and identify common responses across scenarios. Therefore, the distinction needs to be made between shocks that are likely to happen in the organisation's industry/sector and represent a critical threat, versus generic shocks that contain inherent uncertainty.

The Queensland Department of Transport and Main Roads (2000) took a contingency approach to the incorporation of shocks and wildcards by acknowledging their existence but not explicitly incorporating them into its scenarios. It did not incorporate the 'speculative wildcards' into its scenarios as this "would have made the scenarios less plausible and would have meant that many people in the organisation would not be able to engage as effectively in the process of envisioning the future" (Queensland Department of Transport and Main Roads, 2000, p. 18).

The use of shocks or wildcards in scenarios appears better suited to emergency planning whereby common responses to scenarios contain contingencies if a shock were to occur. Industry-specific shocks that represent a real threat should, however, be considered alongside other key uncertainties. In this way, the stress created from examining shocks does not overshadow the underlying purposes of scenario planning.

Lessons learnt from international experiences of scenario planning

Despite notable success stories from the use of scenario planning such as the Shell scenarios during the 1970s, evaluations of practical applications of scenario planning appear to be rare within the available literature. While there is a limited number of reported success stories, Hodgkinson and Wright (2002) points out the lack of examples of where scenario techniques have failed. Despite the apparent lack of scenario planning evaluation, much has been written on suggestions and guidelines for developing and using scenarios, or in most cases, 'pitfalls' to avoid.

Many guidelines on pitfalls to avoid, such as those provided by Roxburgh (2009), tend to follow similar themes; namely, how to get effective engagement and how to mitigate issues encountered when using scenarios for strategic thinking. Some of the key recommendations are captured below (paraphrased from Roxburgh (2009)).

- ▶ The range of future uncertainties can cause high stress to individuals whose personality and working habits are concerned with controllable factors. Therefore, scenario exercises need to state at the outset that exploration of possibilities is the aim of the scenarios and that shortlisting two key uncertainties (if using a matrix approach) does not imply there are no other uncertainties at play.
- ▶ Scenarios should be used as a strategic tool for organisations, not as a product set that strategic policy should be solely based on.
- ▶ Four is often seen as the optimal number of scenarios — they give structure to responding to the vast number of future possibilities without causing confusion over the multiple ways all uncertainties could play out.
- ▶ Scenarios should be acknowledged as **possibilities** as all of the produced scenarios might not come to fruition.

Hodgkinson and Wright (2002) recount a scenario planning exercise where the chief executive of an organisation involved in a scenario planning exercise disengaged as the project progressed. This disengagement was attributed to the high stress created from looking at uncertainties about the organisation's operating environment. This exercise is one of the few recorded examples of scenario planning failure, offering evidence in support of recommendations such as those suggested by Roxburgh (2009).

The nature of scenario planning discussions

The strength of scenario exercises, particularly exploration exercises, comes from the rich discussion about the future and the process of engaging in a different way of thinking. This approach to futures thinking is ideally suited to organisations where knowledge and opinions of individuals vary from the open-minded to the sceptical. Sceptical voices and 'unlikely' events should be embraced as the antagonists in scenario exercises as they represent the challenge of looking at future uncertainties.

Roxburgh (2009) uses an example of an oil scenario exercise where participants were presented with a scenario having oil at \$70 per barrel when the price per barrel was currently \$120. A participant asked what would happen if oil dropped to \$10 a barrel, which others dismissed as being too radical. The scenario facilitators later acknowledged that they should not have been as dismissive as they

were, as oil promptly dropped to \$50 per barrel and history had shown oil was once at \$10 per barrel. Therefore, it is important to capture the radical or speculative voices when discussing an uncertain future, as long as they are restricted to the bounds of possibility.

Scenario planning also has the potential to drive organisational change rather than just improving the strategic capability of individuals. One of the key difficulties organisations face when looking at the future is trying to position themselves in that future, based on their current operation. Just as the environment changes, organisations need to change and adapt. So although the focus should be on how an organisation's operating environment may change, implications for how the organisation itself may, or should, change also needs to be considered. Scenario planning can help identify common responses (whether these are policy or operational responses) that can help ensure organisations have the right number and quality of resources to address the common responses. Organisations should acknowledge as fact that in the future they will be operating differently to how they operate today.

Concluding remarks

Much has been written regarding the power, utility and significance of scenario planning as a strategic tool to broaden the scope for decision-making across government and business. At the heart of scenario planning is recognition that there is no right way to develop scenarios; literature critiquing individual techniques is testament to the ongoing challenges the field faces. Nevertheless, scenario planning has established itself as an important and useful strategic tool. While scenario planning cannot offer concrete answers for today's decision makers, what it can do is facilitate discovery of alternative pathways so organisations can plan to ensure resilience, adaptability and sustainability for an uncertain future.

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