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The Use of Scenario Planning in Public Health:

A Tool for Anticipating Alternative Futures for Strategic Planning

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Abstract

The environment of public health is unpredictable and constantly changing (Venable, Li, Ginter, & Duncan, 1993). As such, the use of strategic management techniques, notably those that deal with the analysis of the forces in the external environment, are of growing interest in the field of public health management (Venable et al., 1993). Scenario planning is one such strategic planning technique. It is in large part an adaptation and generalization of classic methods used by military intelligence. It has been adopted and widely used in business applications, most notably in the energy industry. It works especially well under conditions of high uncertainty and risk - conditions that characterize most public health issues facing our world today (Neiner, Howze, Greaney, 2004). As such, scenario planning appears to be a particularly well suited technique for use in public health (Venable et al., 1993). This paper will explore the history and development of scenario planning. It will outline how it has been successfully used in the private sector and examine how it has and can be successfully used in the field of public health. Further, it will outline scenario planning methodology and discuss the benefits of its use in public health.

The Use of Scenario Planning in Public Health:
A Tool for Anticipating Alternative Futures for Strategic Planning

The environment of public health is unpredictable and constantly changing (Venable, Li, Ginter, & Duncan, 1993). In recent years and months the field of public health has faced many different crises (e.g., SARS, West Nile Virus, Walkerton waterborne outbreak, Listeria food borne outbreak) and many new and expanding problems continue to emerge. Examples of such issues include toxic substances in air, water, and food; chronic diseases such as cancer and heart disease; drug abuse; teenage pregnancy; uncontrolled communicable diseases; and threats of pandemics. In addition, previously conquered diseases such as measles, mumps, and tuberculosis have shown increases in recent years (Venable et al., 1993).

As such, developing strategic management techniques, notably those that deal with the analysis of the forces in the external environment, is of growing interest in the field of public health management (Venable et al., 1993). An organization's ability to maintain an adequate match between internal capabilities and threats is the primary goal of strategic management. Analysis of the external environment, a main component of strategic managment, is the process whereby external trends (often classified as opportunities or threats) are identified, classified, monitored, and assessed for their likely impact on an organization. In some environments, significant trends are few and can be readily forecast with some precision (Venable et al., 1993).

Scenario planning is one such strategic planning method used for anticipating possible alternative futures and making flexible long-term plans. It is in large part an adaptation and generalization of classic methods used by military intelligence. It has been adopted and widely

used in business applications allowing planners to anticipate problems, reevaluate assumptions, and reflect on consequences of those alternative futures (Neiner, Howze, & Greaney, 2004).

Scenario planning is best suited for long-range forecasts involving highly complex and uncertain situations where there are few or no reliable data for quantitative models. As such, this method seems particularly useful for the field of public health (Venable et al., 1993). It can add value to public health planning in a variety of ways, whether it be used in research; by federal/provincial health ministries; individual health departments; or with community partners and stakeholders (Neiner et al., 2004).

This report will examine the history and development of scenario planning. It will outline how it has been successfully used in the private sector and examine how it has and can be successfully used in the field of public health. Further, it will outline scenario planning methodology and discuss the benefits of its use in public health.

What is Scenario Planning?

Scenario planning is a systemic method for learning about the future by *understanding the nature and impact of the most uncertain and important driving forces affecting an organization's environment.* It is a group process which encourages knowledge exchange and development of mutual deeper understanding of central issues important to the future of an organization (Ringland, 2006).

Scenarios can be defined as structured accounts of possible futures. They may be thought of as coherent and plausible stories, told in words and numbers, about possible co-evolutionary pathways of combined human and environmental systems. They generally include a definition of problems boundaries, a characterization of current conditions and processes driving change, an identification of critical uncertainties and assumtptions on how they are resolved, and images of

the future (Swart, Raskin, & Robinson, 2004). The goal of scenario planning is to craft a number of diverging stories by extrapolating uncertain and heavily influencing driving forces that characterize the nature of human and environmental response under contrasting future conditions. The stories together with the work getting there has the dual purpose of increasing the knowledge of an organization's environment and widening both the receiver's and participant's perception of possible future events (Swart et al., 2004). In short, scenarios are alternative, dynamic stories that capture key ingredients of uncertainty about the future of a study system. They are constructed to provide insight into drivers of change, reveal the implications of current trajectories, and illuminate options for action (Fourie, 2007).

Scenario planning is not about predicting the future; rather, it is a method for anticipating alternative futures that may come to pass. It is used to postulate a set of plausible futures instead of trying to predict the future itself (Neiner et al., 2004). Schwartz (1996) defines scenario planning as "a method for articulating the different pathways that might exist tomorrow, and finding your appropriate movements down each of those possible paths". It is an alternative to conventional forecasting and is especially suited for situations with high uncertainty or risk (i.e., lack of reliable data or sound predictive models) as it opens up key issues associated with those futures for stakeholders to debate and allows them to reevaluate existing assumptions that may no longer be valid now or in the future (Neiner et al., 2004).

Importantly, scenarios are not the same as forecasts. Forecasts are based on a single understanding of the present, which is then extrapolated to the future. Scenarios on the other hand are based on different assumptions about the present, which are then extrapolated to different futures (Fourie, 2007). Unlike forecasts, scenarios stress irreducible uncertainties that are not controllable by the people making the decisions. They may encompass realistic

projections of current trends, qualitative predictions, and quantitative models, but much of their value lies in incorporating both qualitative and quantitative understanding of the system and in stimulating organizations to evaluate and reassess their beliefs about the system (Peterson, 2003). Appendix B compares some of the main differences between scenarios and forecasts.

Scenario planning differs from other planning methods, such as contingency planning, sensitivity analysis, and computer simulations (Schoemaker, 1995). First, contingency planning examines only one uncertainty. It presents a base case and an exception or contingency. Scenarios explore the joint impact of various uncertainties, which stand side by side as equals (Schoemaker, 1995).

Second, sensitivity analysis examines the effect of a change in one variable, keeping all other variables constant. This type of analysis works best with small changes. Scenarios, on the other hand, change several variables at a time, without keeping others constant. They try to capture the new states that will develop after major shocks or deviations in key variables (Schoemaker, 1995).

Third, scenarios are more than just the output of a complex simulation model. Instead they attempt to interpret such output by identifying patterns and clusters among the millions of possible outcomes a computer simulation might generate. They often include elements that were not or cannot be formally modeled, such as new regulations, value shifts, or innovations. Hence, scenarios go beyond objective analyses to include subjective interpretations (Schoemaker, 1995).

Scenario planning attempts to capture the richness and range of possibilities, stimulating decision makers to consider changes they would otherwise ignore. At the same time, it organizes those possibilities into narratives that are easier to grasp and use than great volumes of data. Above all, however, scenarios are aimed at challenging the prevailing mind-set. Hence, scenario

planning differs from the three aforementioned techniques in its epistemic level of analysis (Schoemaker, 1995).

As Schoemaker (1995) describes, scenario planning is especially beneficial for use in an organization's strategic planning and vision building. Organizations facing the following conditions will especially benefit from scenario planning:

- Uncertainty is high relative to the ability to predict or adjust.
- Too many costly surprises have occurred in the past.
- The organization does not perceive or generate new opportunities.
- The quality of strategic thinking is low (i.e., too routinized or bureaucratic).
- The organization has experienced significant changes or is about to.
- The organization wants a common language and framework, without stifling diversity.
- There are strong differences in opinion, with multiple opinions having merit.

In short, the technique is applicable to virtually any situation in which an organization would like to imagine how the future might unfold.

History and Background of Scenario Planning

Scenario-based planning has a long history. The broad use of the term "scenario" for characterizing the systematic framing of uncertain possibilities first emerged during World War II, as a method for military planning. The U.S. Air Force tried to imagine what its opponents might do, and to prepare alternative strategies (Chermack & Lynham, 2002). It moved into civil domain after the war when the RAND Corporation was set up to research new forms of weapons technology. RAND's Hermann Kahn pioneered the technique of "future-now" thinking, aiming

through the use of detailed analysis plus imagination to be able to produce a report as it might be written by people living in the future (Ringland, 2006).

The description "scenario" was given to these stories by the writer Leo Rosten, who suggested the name based on Hollywood terminology. Though the terminology was obsolete, he didn't think that the more current term "screenplay" sounded dignified enough. Hermann Kahn adopted the term because he liked the emphasis it gave, not so much on forecasting, but on creating a story or myth (Ringland, 2006).

When he founded the Hudson Institute in the mid-1960s, Kahn further developed the technique of scenario-based planning when he explored possible consequences of nuclear proliferation, defining scenarios as "hypothetical sequences of events constructed with the purpose of focusing attention on causal processes and decision points". Kahn specialized in writing stories about the future to help people consider the "unthinkable". He was best known for his idea that the best way to prevent nuclear war was to think through in detail what would happen if the war did occur, and publicize the results (Chermack et al., 2002).

Around the same time, Standford University had set up its own thinktank called the Stanford Research Institute (SRI), to offer long-range planning for business, incorporating operations research, economics, and political strategy alongside hard science and military consulting (Ringland, 2006).

The late 1960s saw a shift in the work done by organizations like SRI for a number of reasons, including a movement in military spending towards the Vietnam War, and increased interest in finding ways to look further into the future to help plan for changes in sociey, an interest underpinned by the upheavals resulting from the war (Chermack et al., 2002). Similarly, the Hudson Institute started to seek corporate sponsors, which exposed companies like Shell,

Corning, IBM, and General Motors to this style of thinking. Kahn then published "The Year 2000" which clearly demonstrated how one man's thinking was driving a trend in corporate planning (Chermack et al., 2002).

The SRI "futures group" also began using a variety of methods to create scenarios for the U.S. Education system for the year 2000. Five sceanrios were created, and one titled "Status Quo Extended" was selected as the official future. This scenario suggested that issues such as population growth, economic destruction, and dissent would resolve themselves. The other scenarios were given little attention once the official future was selected. The official future reached the sponsor, the U.S. Office of Education, at a time when Richard Nixon's election as president was in full swing. The offered scenario was quickly deemed impossible because it was in no way compatible with the values that were advocated by the leader of the country. SRI went on to do work for the Environmental Protection Agency (Chermack et al., 2002).

Meanwhile, Professor Jay Forrester (1961) of the Massachusetts Institute of Technology was using similar concepts to describe supply and demand chains. The use of scenario concepts in his project were more to develop a model that would help people understand the nature of growth and stir up public debate. The results were published by Meadows, Meadows, and Randers in 1992 (Chermack et al., 2002).

General Electric was one of the first major corporations to use sceanrio analysis in its corporate planning and was one of the early role models in strategic planning (Ringland, 2006). GE led the way in using scenarios to think about the environmental factors affecting its businesses. The method involved using Delphi panels to establish and verify critical variables and indicators, while both trend-impact analysis and cross-impact analysis would then help to assess the implications of the interactions among critical variables and indicators. GE pioneered

an approach whereby the cross-impact effects among likely developments are dealt with qualitatively, with plus or minus signs, which then leads to the development of probable scenarios for the environment (Ringland, 2006).

Practical development of scenario forecasting, to guide corporate strategy rather than for more limited academic uses was further developed by Pierre Wack and Ted Newland at the Royal Dutch Shell Group in the late 1960s and early 1970s in an effort to help the company anticipate global changes in energy supply and demand (Van der Heijden, 2005). In Shell, interest in scenarios at a more conceptual level arose with the increasing failures of planning based on forecasts. Consequently, planners at Shell wanted to develop a system that would help them determine what was predictable and what was fundamentally uncertain in the price of oil. That meant they had to examine what drives oil price, and therefore, the whole question of supply and demand (Van der Heijden, 2005).

Shell's technical people had concluded that supply availability was predictable, growing around 6% every year, and the necessary number of wells could be drilled. This had been the consistent pattern since World War Two and was not questioned (Van der Heijden, 2005). But Pierre Wack was not satisfied with that answer. He looked behind it, considering the people who have control over the reserves who would be making the actual production decisions. In the late 1960s these were still the major oil companies, but the producing governments had started to establish their soverign authority. It was one of Wack's great contributions to the scenario process that he insisted on looking at the people behind decisions, not just the technical or macro phenomena. The planners started to wonder whether it would make sense, from the point of view of the producing governments, to continue to supply the increasing quantities required by the oil consumers. They had to conclude that this was sufficiently uncertain to make it worth developing

a new scenario. This scenario (one of six initially) became known as the crisis scenario, in which producing countries would refuse to continue to increase production beyond what made sense from the perspective of their own needs (Van der Heijden, 2005).

When the oil crisis actually occurred in 1973 it became clear that scenario analysis had put the company on a thinking track where traditional forecasting would never have taken it. Scenario-based planning allowed the company to override the domination of the credible, popular but very wrong imagined future. As a consequence, Shell Oil was prepared for the energy crisis when other companies were not (Van der Heijden, 2005). They suffered much less from overcapacity and outperformed the industry by a long margin. Scenario planning was therefore credited for helping the company through the turbulent 1970s and 1980s and making the company the leader in the oil industry (Van der Heijden, 2005). Since that time, Shell has played a leading role in developing scenarios to highlight world development possibilities that are relevant to company's futures, and to prepare company mangers for responding to an uncertain future (Van der Heijden, 2005).

The scenario planning era during the 1970s was short lived however. The recession following the oil crises in the mid and late 1970s forced corporations to cut corporate staff. Oversimplified scenarios came into criticism, often justifiably. This, along with long-standing habits of rigid long-term planning, and a failure to distinguish scenarios from forecasts, led corporations to return to more traditional ways of planning (Chermack et al., 2002).

The planning crises of the 1980s, however, led to renewed interest in how planning happens, leading many futures consultancy firms to develop scenario planning methodologies (Ringland, 2006). During this time, approaches in scenario-based planning had developed into sophisticated forecasting techniques used primarily for the integration of other qualitative

approaches to long-range forecasting. This stream of scenario work, known as "backcasting", was inspired by the early work of Lovins in developing scenarios of "soft energy paths" (Swart et al., 2003). Although it was based upon judgmental forecasts, it became increasingly utilized by groups of experts who used it with the intent to reduce risk in situations with lack of reliable data and high uncertainty. Studies on it were conducted in dozens of countries, mostly at the regional and national level. More recently, this backcasting approach has been applied in the context of sustainable futures, at both the regional and global scales (Swart et al., 2003).

Shell continued to have success with scenario planning through two more oil incidents in the 1980's, and slowly, through the 1980s and 1990s, corporations cautiously began to reintegrate the application of scenarios in planning situations (Chermack et al., 2002). Top managers in corporations began using it as a way of influencing decision making down through the line through context setting, rather than direct intervention. For example, simple trend-line analyses were not able to predict or incorporate the effects of the world oil price increases into their models. When looking at U.S. auto sales in early 1983, Schnaars found that scenario planning showed an advantage over econometric models and was most advantageous over those series where uncertainty was high (Venable et al., 1993). In short, scenario planning has been adopted at a national level in some cases, and its methods have been successful in bringing diverse groups of people together (Chermack et al., 2002).

Types of Scenario Planning

Scenario-based planning is essentially a qualitative technique. It proceeds more from intuitive leaps than from computer analyses, although it may incorporate the results of quantitative models (Venable, 1993). In general, scenario methodologies exist along two dimensions: objective versus normative, and analytical versus intuitive (Lindgren, 2003).

Objective versus Normative Approaches:

The terms "objective" and "normative" are not perfectly descriptive, but they have traditional meanings in futures research (Lindgren, 2003). Objective scenarios evaluate the future external environment – trends, uncertainties, "break points" etc. – and then seek, through analyses of implications, to help an organization shift its strategy or improve its decisions to take the impacts of that environment into account. It tries to articulate different plausible future societal developments, and explore their consequences (Lindgren, 2003).

Normative scenarios take the opposite point of view. They ask questions about alternative futures in light of organization visions and points of leverage for the organization in the external environment (Lindgren, 2003).

Characteristically, objective approaches treat the external environment as an uncontrollable factor, whereas normative approaches assume that an organization can influence the external environment significantly through its actions. Both approaches have merit, and in practice, in comprehensive scenario planning, both kinds of thinking occur. But the starting point is quite different in the two approaches (Swart et al., 2004).

Even though scenarios can be done utilizing both approaches, in practice there is often an emphasis on one over the other. Neither of these types is value-free, since both embody extra-scientific judgments about how the problem is to be framed, and what are reasonable or feasible assumptions. However, they differ in overall purpose. That is, the choice between objective or normative scenarios is dependent on the objectives of the scenario development exercise (Swart et al., 2004). Normative scenarios represent organized attempts at evaluating the feasibility and consequences of trying to achieve certain desired outcomes to avoid the risks of undesirable ones. They are constructed to lead to a future that is afforded a specific subjective by the scenario

authors (Swart et al., 2004). Objective scenario analysis, on the other hand, describes possible developments starting from what is known about current conditions and trends. They then try to articulate different plausible future societal developments, and explore their consequences (Swart et al., 2004).

Analytical versus Intuitive Approaches:

Analytical scenario approaches focus more on quantitative analysis and use formal models, mathematical algorithms and simulations to develop both broad alternative scenarios and their details (Lindgren, 2003). Quantitative modeling is often used for predictive analysis, which is appropriate for simulating well-understood systems over sufficiently short times. But as complexity increases and the time horizon of interest lengthens, the power of prediction diminishes (Swart et al., 2004). Quantitative forecasting is legitimate to the degree the state of the system under consideration can be specified, the dynamics governing change understood and known to be persistent, and mathematical algorithms can be created that map these relationships with sufficient accuracy for simulation (Swart et al., 2004). These conditions are violated when the task is to assess the long-range future of socio-ecological systems – state descriptions are uncertain, causal interactions are poorly understood and non-quantifiable factors are significant. In such situations, even probabilistic forecasting of a given future state, or a spectrum of possible states, is not feasible. Systems can branch into multiple future pathways, each consistent with current conditions, trends and drivers, and some entailing discontinuous and novel behavior. This suggests the need for non-predictive forms of quantitative scenario analysis (Swart et al., 2004).

Intuitive scenario approaches focus more on qualitative (narrative) visions of the future that reflect the "mental maps" of the people developing and using the scenarios. They, too, may have considerable analytical detail, but intuition plays a greater role in their initial development

(Lindgren, 2003). The limitations of quantitative analysis can be complemented with qualitative scenario analysis, which better capture other factors influencing the future such as system shifts and surprises, or non-quantifiable issues. Scenario narratives give voice to the important qualitative factors shaping development such as values, behaviors, and institutions, providing a broader perspective than is possible from mathematical modeling alone (Swart et al., 2004).

Again, in practice, most scenario work involves both approaches. However, their starting points are quite different.

A Balanced Approach

The trend in scenario methodology is toward more balanced approaches that incorporate both dimensions (Lindgren, 2003). Most futurists recognize the complementary values of intuition, vision, analysis, leverage, and truly uncontrollable externalities. Recent combinations of long-term narratives with scenarios quantification are attempting to combine the advantages of both approaches. Narrative offers texture, richness, and insight, while quantitative analysis offers structure, discipline and rigor (Swart et al., 2004). Using both approaches offers the potential to foster the balanced integration of both objective and normative or interpretive traditions. The field is likely, therefore, to continue to move toward richer methods that draw on the most useful set of tools for particular scenario issues and organizational cultures (Swart et al., 2004).

From a methodological point of view, scenario authors can attempt to discern the likely outcome of a range of "expected" trends, outline the implications of different assumptions not chosen on the basis of likelihood (what-if analysis) or examine the feasibility and implications of desirable futures – or risks of undesirable ones (back-casting) (Swart et al., 2004). A combination of back-casting from an array of possible end-states and forward-looking analysis from initial conditions and drivers of change is often appropriate. The latter helps to identify

long-term risks and to specify certain conditions, while the former identifies the bandwidth of initial trajectories and available actions to "bend the curve" toward long-term goals (Swart et al., 2004).

The Scenario Planning Process

There is no one-size-fits-all approach to scenario planning (Miller & Waller, 2003). The idiosyncrasies of organizations, the unique environmental contexts in which they find themselves, and the issues motivating scenario planning all affect the ways in which organizations go about the scenario planning process. Although there are many different approaches to scenario planning among different organizations, the literature suggests that many of the different approaches share common features (Miller et al., 2003). Some of the essential steps to developing and using scenarios, adapted by Ralston and Wilson (2006), are described subsequently.

Getting Started

Step 1: Develop a case for scenarios - the first step is to develop the information and arguments for conducting a scenario-planning assignment. Not every strategic-planning decision is suited for scenarios, and the case must be made that the circumstances are appropriate for scenario planning and the benefits clearly outweigh the costs (Ralston & Wilson, 2006). To do so, the following should be done (Ralston &Wilson, 2006):

- Lay out the needs for addressing the uncertainties in the external environment and identifying the potential strategic implications for the organization.
- Identify the costs of not developing a better understanding for key patterns and trends.

- Identify the benefits of developing a structured means for integrating information about the external environment and aligning strategy development to that integration effort.
- Describe what resources, expertise, inputs etc. it will take to develop and use scenarios to help make the decision.
- Develop references for using scenario planning.
- Provide an analysis of the planning techniques that are alternatives to using scenario planning.

Step 2: Gain Senior Management Support, and Participation - Once the decision has been made to proceed with the effort, the organization must decide on whether, how, and to what extent all the decision makers or members of the senior management team should be involved in the process of developing the scenarios. Given that ultimately the senior managers will be called upon to use the scenarios in their strategic decision making, there should be no question about the need to involve them in the development process, at least to the extent that they have sufficient understanding of, and commitment to, the scenarios and are comfortable using them as the framework for their strategizing (Ralston & Wilson, 2006). Senior management participation is critical in (Ralston & Wilson, 2006):

- *Focusing the project* – As the ultimate decision makers, executives have the responsibility for understanding the decision(s) to be made, defining the scope of the scenarios, and so setting the agenda for the scenario-planning team.
- *Reviewing key trends and uncertainties analyses* – These analyses are a critical step leading to structuring the scenarios and evaluating potential outcomes of strategic alternatives. It is essential, therefore, that the scenario team's insights be

reviewed by the management team so any glaring differences in perceptions about key dynamics in the external environment can be identified and resolved before proceeding further with the process.

- *Reviewing the scenario structure* – The scenario team should review its proposed scenarios in outline form with senior management to ensure that they can accept the proposed scenario logics and coverage of the issue.
- *Assessing the strategic implications of the scenarios* – Clearly this task is ultimately the responsibility of management, not of the scenario team, although the team can and should provide senior management with its preliminary assesment of these implications.

Step 3: Frame the Issues and Define the Decision Focus – Scenario planning must have a clear purpose and focus. Thus, it is important to determine what a scenario planning process is intended to achieve (Ralston & Wilson, 2006). Scenario planning produces the best results when the scenario effort is based on the elements of the decision to be made. The goal is to have the scenarios provide a clearer sense of future possibilities for the decision elements and the forces that influence them (Ralston & Wilson, 2006). Virtually any decision or area of strategic concern in which environmental factors are complex and changing may be appropriate for treatment by scenarios. When the stakes are high and when outcomes for the organization will be heavily affected by the external events and outcomes, then scenario planning is the appropriate tool (Ralston & Wilson, 2006).

The decision focus essentially aims to provide an organization with insights into the future that will help it make strategic decisions that confront them (Ralston et al., 2006). Focusing the decision has two immediate advantages (Ralston & Wilson, 2006):

- *It concentrates thinking about the future on trends and forces that most affect the organization and on decisions that have to be made.* With this focus, an organization can concentrate its imagination and reasoning on trends, issues, and possibilities that really matter.
- *It provides a link to action.* Having such a focus means that the link to action is built into the process from the start, and this linkage is particularly important in selling the benefits of scenarios.

The decision focus should be simple in content and include (Ralston & Wilson, 2006):

- An overall description of the decision to be made, usually a short paragraph in length. While the focus description is simple in its content, its creation often involves extensive consultation and deliberation. The first task is to conduct interviews with key stakeholders who will help make the decision in order to identify the underlying needs for the decision, the goals to be achieved with the decision, and the alternatives to be considered.
- Scoping statements of functions, geographies, and organizational units involved in or affected by the decision.
- Scoping statements of what's not included.
- Time period in which the decision will be realized.

Step 4: Identify Participants/Form the Scenario Team - Scenario development is, first and foremost, a team effort, typically requiring diverse viewpoints, various kinds of expertise, personal and communication skills and good links to information sources throughout the organization. Most effective is a group of eight to twelve people who meet these requirements and form the core team, doing most of the work and coordinating the work of others (Ralston &

Wilson, 2006). The participant's areas of expertise should include the strategies and decisions under consideration and knowledge of the external forces that influence them. As a group, they should be able to represent differing points of view held by senior management (Ralston & Wilson, 2006).

The team has three primary responsibilities (Ralston & Wilson, 2006):

- To define the critical uncertainties in the organizational environment.
- To develop a set of future scenarios that effectively covers the key alternative outcomes to these uncertainties.
- To initiate the process of thinking through the strategy implications of these scenarios.

The participants need not be limited to those individuals whose interests will be affected directly by the scenario planning process. Input from other insiders with unique experience or expertise also should be solicited. In certain situations, input from individuals representing interests outside the organization such as clients, community stakeholders, or other government agencies can be helpful. Once the group of contributors assembles, an atmosphere of openness and dialogue should be established so that the participants can freely articulate their insights (Miller et al., 2003).

Laying the Environmental-Analysis Foundation

Step 5: Gather Available Data, Views, and Projections - Scenarios depend equally, for their success and utility, on ideas and information. They require both data on what has happened in the past and what may happen in the future and why. For most decision-making situations, much of the data and insight needed already resides within the organization; it's a matter of finding and unveiling this information (Ralston & Wilson, 2006).

Examples of ways to obtain this desired information include (Ralston & Wilson, 2006):

- Gathering available studies and data from inside the organization. This can be done by conducting interviews, surveys etc.
- Conducting secondary research of external sources.
- Interviewing key internal experts, and senior managers about their knowledge and views.

Step 6: Identify and Assess Key Decision Factors - At this point, the decision focus for the scenario planning will have been developed. This is not to say, however, that the focus is well defined or that the key issues are very well understood. Consequently, a great deal of insight and clarification must be gained by discussing such questions as (Ralston & Wilson, 2006):

- What is the reasoning behind the selection of the particular decision focus? Are there underlying assumptions of imminent major changes in this area? If so, what are these assumptions?
- Would the decision in question represent a major departure from the organization's current trajectory? Or would it represent just a modification of existing strategy?
- How does the decision relate to other goals, objectives, and values of the organization?

In addition, the scenario team will need to develop a more complete description of scope issues such as (Ralston & Wilson, 2006):

- The time frame for when the decisions will be made.
- The time period for the scenarios of the future (i.e., they can range from less than five years to more than twenty years).

- Geographic coverage.
- Organization areas, functions, technologies, markets, and so on included and excluded.

Having established the central focus and purpose for the scenario planning, the scenario team can then identify and analyze the key decision factors (KDF's) of the decision. Key decision factors are the key externalities affecting the decision. They are the events or outcomes about the future that more would like to be known about in order to improve the quality and relevance of the decision (Ralston & Wilson, 2006).

To develop KDF's for a decision, the scenario team must brainstorm potential KDF's, conduct some clustering to combine similar issues and eliminate duplicates, and then select the most important ones to be addressed by the scenarios (Ralston & Wilson, 2006).

Step 7: Identify Critical Forces and Drivers - The next task in scenario development is to look for the driving forces of the macro-environment that influence the key factors identified earlier. For example government regulations might influence them. But beside government regulations, there are many less obvious external factors as well. Identifying and assessing these fundamental factors is both the starting point and one of the objectives of the scenario method (Ralston & Wilson, 2006). Driving forces are the elements that move the plot of a scenario that determines the story's outcome. Driving forces often seem obvious to one person and hidden to another. Therefore the identification of driving forces should be done in a team, by brainstorming together. By looking on such driving forces, it is helpful to run through this common list of categories of driving forces: social forces/demographic developments, technological developments, economic developments and events, political developments and events, environmental developments. Normally, organizations have little control over driving forces.

Their leverage for dealing with them comes from recognizing them, and understanding their effect (Ralston & Wilson, 2006).

Step 8: Conduct Focused Research - After the external forces and drivers have been identified, the next step is to identify the largest gaps in knowledge or expertise and which issues should be understood in more detail for the purposes of creating decision-support scenarios (Ralston & Wilson, 2006). The basic purpose of this step is to develop a shared understanding of the future prospects for key formative forces that the scenarios must deal with – what the major trends and uncertainties are; how the forces are interrelated; which are most important in influencing the course of the key decision factors; and which best represent underlying or driving forces for significant change in the future (Ralston & Wilson, 2006).

Creating the Scenarios

Step 9: Uncover the predetermined elements/Determine what is known - Predetermined elements are developments and logics that work in scenarios without being dependent on any particular chain of events. That means a predetermined element is something that seems certain, no matter which scenario comes to pass. For example the most commonly recognized predetermined element is demographics, because it is changing so slowly (Ralston & Wilson, 2006). For example the Soviet Union experienced a sharp decline in births during and immediately after World War II. One generation later, in the 1960s and 1970s, that original "baby bust" was echoed by an even greater decline than we saw for example in the U.S. In the mid-eighties therefore the U.S.S.R. experienced a decline in its labour force as fewer and fewer young people came of age. This might have induced its economic breakdown which has lead to its political breakdown. Since the 1960s and 1970s, the decline in labour force in the U.S.S.R. in the mid eighties was a predetermined element (Ralston & Wilson, 2006). Identifying such

elements is a tremendous confidence builder in strategic decision making. Managers can commit to some policies and feel sure about them (Ralston & Wilson, 2006). There are several useful strategies for looking for predetermined elements. For example you could look for slow-changing phenomena like the growth of populations or the building of physical infrastructure. You could look for constrained situation, where companies, nations or even individuals have, at least for a certain time, no choices (Ralston & Wilson, 2006).

Step 10: Assess the Importance and Uncertainty of Forces and Drivers - In every plan critical uncertainties exist. Scenario planners seek them to prepare for them. Critical uncertainties are often related to pre-determined elements. They are identified by questioning the assumptions about predetermined elements and chains of predetermined elements. Critical uncertainties are the variables in scenario planning and are the basis to create different scenarios in parallel (Ralston & Wilson, 2006). One method to identify the most important critical uncertainties is to rank key factors and driving forces on the basis of two criteria: first, the degree of importance for the success of the focal issue or decision identified in step one; second, the degree of uncertainty surrounding those factors and trends (Ralston & Wilson, 2006). The point is to identify the two or three factors that are most important and most uncertain. These factors then form the basis for the different scenarios, because the goal is to end up with just a few scenarios whose difference makes a difference to decision-makers (Ralston & Wilson, 2006).

Step 11: Identify Key Areas of Uncertainty - The basic objective of this step is to identify and describe two, three, or four key areas of uncertainty that (Ralston & Wilson, 2006):

- Encompass all – or at least the majority- of the high impact/high uncertainty forces.

- Push the envelope of uncertainty so that the resulting scenarios will be distinctly different from one another, not merely modest variations of a central theme.
- Are logical – the alternative outcomes of the axes are logical consequences of the driving forces.

The first task in this step is to organize the identified forces of high impact/high uncertainty into tightly linked clusters of related forces that become the key axes of uncertainty, with each axis defined by a pair of alternate logics. A logic is a hypothesis about the dynamics of the external environment in the future (Ralston & Wilson, 2006). Each logic will have a central theme or dynamic that describes how the forces will interrelate. The ideas for the logics come from the mental models of change that are based upon the perceptions of the scenario team, those of key decision makers, those of other experts, and established theories of social, political, economic, and technological change (Ralston & Wilson, 2006). The scenario team brings all these elements together to identify plausible and useful logics. The facts and uncertainties from previous steps shape, constrain, and make realistic the logics; models of change point to what kind of change – and how much - can occur and what basic dynamics are possible in the time period of the scenarios (Ralston & Wilson, 2006).

Step 12: Selecting Scenario Logics - The overall goal of this step is to develop a set of alternative scenarios that describe the detailed possible futures for the organization in a language and form that decision makers can use (Ralston & Wilson, 2006). The scenarios must describe the important trends and driving forces as well as the major uncertainties and their possible outcomes, and do so in such a way that decision makers can understand them, learn from them, and apply them in decision making circumstances (Ralston & Wilson, 2006).

In this step, planners must shortlist the scenarios to a small enough number that decision makers will be able to remember, understand their differences, and communicate about them with others. At the same time, the set of scenarios needs to cover the range of possible futures the organization could face (Ralston & Wilson, 2006).

In general, it is recommended that the number of scenarios be limited to no more than four (Ralston & Wilson, 2006). Many scenario planning exercises follow an aspirational model for scenario development with an alpha scenario describing status quo/business as usual; a beta scenario describing apocalypse/ hard times and negative developments within the organization; a delta scenario describing utopia/ positive transformation; and a fourth visionary scenario with extrapolative developments from the alpha scenario and hopeful advances within the organization (Lindgren et al., 2003).

Regardless of the number of scenarios that the team selects to develop, the scenario must meet the following criteria (Ralston & Wilson, 2006):

- They must be plausible – they must fall within the limits of what might reasonably be expected to happen.
- They must be structurally different – they are not simply variations of a base case. The futures they describe take radically different courses in some important respects.
- They must be internally consistent – that is, no scenario has any built in inconsistencies that undermine its credibility.
- They must have utility. Each scenario must adhere to the decision focus and be useful for identifying strategic options for the organization.

- The scenarios should challenge conventional wisdom about the future – that is, they should encourage the organization to broaden its horizons and broaden its definition of probability.

It is important that scenarios not be selected on the basis of judgement as to their probability of occurrence (Ralston & Wilson, 2006). Probability has more to do with forecasts than with scenarios; and scenarios are not forecasts, for one cannot reasonably "forecast" three or four quite different futures. Scenarios, as a collection of possible futures, are intended to establish the boundaries of uncertainty and the limits of plausible futures (Ralston & Wilson, 2006).

Step 13: Composing scenarios - The main activity of this step is essentially one of story telling, describing how the differing scenario logics might play out to create different futures. As already noted, scenarios should be designed to have a plot and a story line, tracing trends and developments, cause and effect, and the inter-relationships among events (Ralston & Wilson, 2006).

Storytelling is an art, not one that is normally practiced by most organizations. But it is a capability that can be adapted to the needs of strategic planning and developed with learning and experience. This learning process can be focused and hastened by (Ralston & Wilson, 2006):

- Spelling out the implications of the scenario logics.
- Tracing cause-and-effect chains. The scope and detail of the stories can be expanded by extrapolating the consequences of a relatively small number of events.
- Highlighting critical events. Scenarios take on clearer focus and greater meaning when they are defined with specific events or developments. The precise event that is described in the scenario may not, in fact, occur – and its non-occurrence might

not affect the overall validity of the scenario – but the level of detail it provides gives added meaning and clarity to the scenario.

- Incorporating conflict. Scenarios become interesting and challenging when conflicts among participants' goals, assumptions, and expectations about the future and a new reality are included. A story that is simply a series of events from beginning to end describing how future outcomes meet expectations of participants is uneventful.

Each scenario should include the following components (Ralston & Wilson, 2006):

- *Scenario title* – each scenario should have a brief, descriptive title that facilitates understanding, comparison, and discussion.
- *Brief Description* – a one paragraph description serves to convey the essence of each scenario. The purpose of the description is to capture the essential dynamics of each scenario, highlighting the major forces at work and the differing outcomes that they produce.
- *Narrative* – this is the detailed account of how each scenario might evolve, describing a fairly detailed "history" of the future. It is here that storytelling capability is most needed, pulling together the main threads of the developing trends into coherent patterns and "seeding" the story with specific events that may not be inevitable parts of the scenario but that give substance and detail to the plot. This level of detail is needed to make the scenarios useful as test beds for developing strategy rather than merely "interesting" stories.
- *Comparison table* – finally, it is helpful to develop a table comparing how the key elements of the future "play out" in each scenario.

The objective of composing scenarios is to create alternative stories of the future that capture all the discussion of forces, trends, and uncertainties that have occurred and that will challenge how decision makers think about the future threats and opportunities. Each detail, character, or event used in the story is part of that effort (Ralston & Wilson, 2006).

When composing scenarios, there are some recommended guidelines to follow (Ralston & Wilson, 2006):

- *Give each story a beginning, middle, and an end.* Every scenario should give the reader a detailed understanding of the forces at work at the beginning of the story; describe how they evolve and interact, and what new forces develop, in the period covered by the scenario; and highlight the changes in the strategic picture that have developed by the end of the period covered by the scenarios.
- *Remember that not everything changes.* Some key elements remain reasonably constant across the scenarios.
- *Populate the scenarios with characters.* Introducing critical characters into scenarios can serve to bring the stories to life and give them focus and added meaning.
- *Include dramas or conflicts to help convey how the world is changing.*
- *Use present tense so that the story is written as if the participants were omniscient.*
- *Make each story unique.* Given that the scenarios have been selected to represent very different futures, the story line, characters, and events of each need to convey and alternate perspective. Often the story line and sequence of events are described in a different order to help convey the dynamics of a different world.

The length of the scenarios will vary based on their purpose, on the topic, on the resources and time available to do the writing, and on the needs and culture of the organization. Typically, for strategic-planning purposes, scenario narratives are two to three pages in length and comparison tables are ten to twenty pages in length (Ralston & Wilson, 2006).

Moving from Scenarios to a Decision

Step 14: Assess the scenarios/Test for plausibility - Once the scenarios have been developed in some detail, then it is time to return to the decision identified in step one. Are they relevant for the goal? Are they internally consistent? Are they archetypical? Do they represent relatively stable outcome situations? How does the decision look in each scenario? What vulnerabilities have been revealed? Is the decision or strategy robust across all scenarios, or does it look good in only one or two of the scenarios? (Ralston & Wilson, 2006). If a decision looks good in only one of several scenarios, then it qualifies as a high-risk gamble, especially if the company has little control over the likelihood of the required scenario coming to pass. The question that should be discussed by management is - how the strategy should be adapted to make it more robust if the desired scenario shows signs of not happening? (Ralston & Wilson, 2006).

Step 15: Identify further research needs - Based on the scenarios, assess where more information is needed. Where needed, obtain more information on the motivations of stakeholders, possible innovations that may occur in the organization and so on (Ralston & Wilson, 2006).

Step 16: Get to the decision recommendations - Any organization using scenario planning has to have some sort of process or template in place to move from scenarios to strategy. The major benefits of creating scenarios will be missed if the planners cannot develop and defend a

set of decision recommendations. The key success factors for developing good recommendations include (Ralston & Wilson, 2006):

- Use multiple criteria, which permits consideration of several measures of value and risk rather than estimated financial returns and capabilties alone. The evaluation process should not be thought of as an algorithm for automatically selecting the alternative with the highest rating. Criteria ratings do not add well, and the team should consider the individual criteria, and combinations of criteria, separately in developing the recommendations.
- Use criteria that are easily understood. The more subtleties and variables involved the less uniform and more subjective the evaluations will become.
- Allow ample time. Time pressure might result in hasty decisions. The outcomes from a hasty process will be obvious to others down the road.
- Stay disciplined and focused in doing the evaluations. It is easy to fall into the habit of assessing things haphazardly, especially when fatigue sets in.
- Strive for objectivity. Try to include known facts and research findings to support the evaluations.
- Ensure consensus on criteria and criteria ratings before developing the final recommendations.
- Remember to refer back to the original decision focus and question whether the selected recommendations, if executed, will achieve the desired results.
- Near the end, ask how prepared the organization is for surprises or disruptions in the external environment. Can the organization survive a major surprise? Are there contingency plans in place?

Step 17: Select leading indicators and signposts/Formulate strategies - A leading indicator or signpost is a specific value or outcome of an important force or driver. Organizations execute strategic action plans when particular indicators or signs are identified in the future. Early warning indicators of new developments need to be identified to help the organization foresee what scenario their environment might be moving toward and what strategic options would be of most value to implement. The signs to monitor are identified by reviewing the forces and drivers of the scenarios and the decision recommendations (Ralston & Wilson, 2006).

The process of identifying indicators and signs starts with the scenario axes of uncertainty and the strategic recommendations. There is much too much information to identify everything so organizations need to focus on monitoring only forces and signs that provide early warning indicators on issues which they can act upon (Ralston & Wilson, 2006).

Research analysts, experts, and specialists in the areas of interest should be asked to identify the forces, indicators, and signs that would give early warning of the scenario outcomes or the need to make a decision about a particular strategy. Those individuals should work directly with scenario team members to develop the portfolio of forces to monitor (Ralston & Wilson, 2006).

Key criteria that should be applied when selecting the forces and signs include (Ralston & Wilson, 2006):

- *Early warning indicator?* Does the sign provide an early warning of the future? What does the sign indicate? What is the time window for making a decision?
- *Information available?* Is information available about potential outcomes for the force? How difficult is it to gather that information? How reliable is it?
- *Cost?* What does it cost to obtain the information?

- *Trustworthiness of information?* How believable are the signs? Will decision makers act on the sign information?

The forces and signs selected will become the basis for planning the monitoring activities.

Step 18: Communicate results to the organization - Communicating the findings, conclusions, and recommendations of scenario planning is the key step in the process. This step can be difficult because it requires changing how decision makers in the organization think about a complex situation and influence the solutions and factors they might use in making a decision (Ralston & Wilson, 2006).

The communication step must convince the decisions makers that the scenario and strategy analyses were thorough and complete, provide compelling insights on important issues, and transmit the scenario team's recommendations. The ultimate goal of this step is to have decision makers use the scenario planning findings and conclusions (Ralston & Wilson, 2006).

Step 19: Develop and screen policies – Once the findings, conclusions, and recommendations of scenario planning have been communicated to the decision makers the ultimate goal is to have the decision makers use this information to test, analyze, and create policies (Peterson et al., 2003). The simplest use of the scenarios is to assess how existing policies would fare in different scenarios. Such an approach can identify weak polices and those that are more robust to uncertainty about the future (Peterson et al., 2003). A slightly more sophisticated approach is to identify the properties of policies or actions that perform well in all the scenarios. In this process, it is important to identify traps and opportunities and aspects of the current situation that could influence these scenario features. This process may suggest novel policies, areas for research, and issues to monitor (Peterson et al., 2003).

Scenario planning that involves stakeholders can provide a forum for policy creation and evaluation. Stakeholders who become involved in the scenario-planning process are likely to find that some scenarios represent a future that they would like to inhabit, whereas others are highly undesirable (Peterson et al., 2003). This process of reflection can stimulate organizations to think more broadly about the future and the forces that are creating it and to realize how their own actions can move the system toward a particular kind of future (Peterson et al., 2003). In this way, scenario planning allows organizations to step away from entrenched positions and identify positive futures that they can work at creating. Policy screening often identifies new questions, new variables, and new types of unknowns. These concerns can stimulate either another iteration of the scenario planning process or another form of action (Peterson et al., 2003).

A successful scenario planning effort should enhance the ability of organizations to cope with and take advantage of future change. Decisions can be made, policies changed, and management plans implemented to steer the system toward a more desirable future. New research or monitoring activities may be initiated to increase understanding of key uncertainties, and they may stimulate the formation of new coalitions of stakeholder groups (Peterson et al., 2003).

Use of Scenario Based Planning in the Private Sector

The use of scenario analysis in the private sector is widespread and growing (Venable et al., 1993). In the late 1970s scenario planning was adopted by a significant fraction of the Fortune 1000 companies, based on a variety of techniques. Many of these used multiple scenarios (Van der Heijden, 2005). Roughly three-quarters of the firms had adopted the approach after the oil embargo provided such a deep shock to previously stable views of the future (Ringland, 2006). By 1983, the percentage of scenario users rose to 50 percent. More than 1100

European firms have adopted scenario planning as one of their strategic management tools (Ringland, 2006).

The turbulence of the 1990s and the increased interest in managing uncertainty through scenario thinking and planning have caused all major management consultancies to develop scenario methodologies in one form or another (Lindgren & Bandhold, 2003). A recent report by the Corporate Strategy Board, based on a survey of over 200 chief strategy officers at large companies, found that scenario based planning is now the single most commonly used conceptual tool used by planning strategists (Lindgren & Bandhold, 2003). A separate study, also by the Corporate Strategy Board, on scenario based planning found that half of all their member companies have used scenario based planning at some point in the recent past (Lindgren & Bandhold, 2003).

Today, Shell continues to use scenario planning as an integral tool in the strategy process and other organizations have adapted this approach as well. For instance:

- British Airways has used the Shell approach to scenario planning to help create a process for developing and testing strategies in the light of future uncertainties (Ringland, 2006).
- Major construction companies have used the technique for "back of the envelope" examinations of business propositions and as part of its project portfolio management (Ringland, 2006) .

As Ringland (2006) describes, scenario planning is also frequently used in industry restructuring. Today, industries facing restructuring range from clothing companies to the high-tech sector such as pharmaceuticals. Examples from Ringland (2006) include:

- Scenario planning is a regulary used business tool at U.S.-based clothing company Levi-Strauss as a way of considering options for decision making. Issues examined could range from the extreme example of what would happen if cotton no longer existed, to the impact of the deregulation of the cotton industry in the U.S.
- In the health sector, several hospital systems in the US have used scenarios to improve the ability of the management team to share a flexible and coherent vision. The UK's National Health Service (NHS) carried out a scenario exerise – the Hemingford scenarios – to help plan for change in the NHS and as an aid to strategic thinking and learning.
- In France, scenarios have been used to help plan the way forward for the steel industry.
- A Finnish forestry company uses scenarios to think about changes in the uses for paper.
- The use of scenarios to assist strategic planning in the advertising industry has been described in Schoemaker (1995).
- The pharmaceutical industry faces a number of strategic changes in light of consumer expectations, political pressure and new sources of competition.
- KRONE used scenario thinking to reorient its product line as copper cable was replaced by other forms of telecom connector. It helped develop 200 new product ideas.
- Glaxo used scenarios to open up the discussion of diagnostics versus prescription drugs as a future direction for the pharmaceutical industry.

There are many examples of organizations using scenarios to anticipate political and economic changes. Examples from Ringland (2006) are as follows:

- At the insurance company Erste Allgemeine Versicherung, it was used to anticipate the results of political changes e.g., the fall of the Berlin Wall. The company was able to establish and expand itself in Central Europe.
- United Distillers (now Diageo) has carried out a number of scenario development exercises to assess the future markets such as India, South Africa, and Turkey.
- Unilever used scenarios to explore new markets in Russia and Poland.
- The Corporation of London used Scenarios for China and India to explore the threats and opportunities to financial services in the City of London.
- Morgan Stanley Japan used scenarios to rethink its strategy in the light of deregulation of Japanese markets.

There are also examples of organizations using scenarios to anticipate environmental pressures. Examples from Ringland (2006) include:

- Electrolux Group used scenarios for Europe in relation to global warming, use of toxins and reuse and reprocessing which led to a major strategic change in the commercial cleaning business. Triggered by the reuse scenario, the cleaning business became more service oriented. It became more aware that there was value in its products even beyond the economic use for customers. As a supplier, the business could reuse materials or parts of the product and so sell the customer a service of continuous availability and not a product with a finite lifespan.
- At Pacific Gas and Electricity, scenarios dispelled assumptions about the "official future" and caused a strategy of working to reduce energy consumption.

- Shell's global scenarios explicitly take climate change into account.
- Finland's FINSKEN project developed scenarios for the next century, incorporating climate change.

In short, scenario-based planning has been shown to be used by a range of private sector organizations – from small manufacturing companies to large multinationals – to anticipate change in a number of dimensions.

Benefits of Scenario Planning in the Private Sector

Scenarios have been shown to make their main contributions to private sector organizations by enabling them to turn uncertainty into a source of advantage (Peterson, Graheme, & Carpenter, 2003). Uncertainty can be confusing and demoralizing. It can lead to inaction or "paralysis by analysis" rather than decisiveness and action (Peterson et al., 2003). However, uncertainty can be viewed as an opportunity. It can inspire action because the future is not always determined by the plans and actions of people (Schoemaker, 1995). Scenarios help organizations deal with uncertainty (rather than be defeated by it) by teaching them to look at all the possibilities, "think the unthinkable", prepare for the unexpected and even the unlikely (or what is believed to be so), and develop the flexibility, resilience, and speed of response which are essential winning qualities for any organization caught up in a confusing, rapidly changing environment (Ralston & Wilson, 2006).

The merits of scenario-based planning in the private sector for dealing with uncertainty are many. Some of the many benefits, as adapted by Ralston and Wilson (2006), are as follows:

- *Scenarios develop an integrated approach for organizations to think about their environment.* They are a practical way of integrating the voluminous, often incomplete, and sometimes contradictory information – both quantitative and

qualitative – that bombards organizations from a variety of sources. They enable organizations to develop "pictures of the future" which can be applied in a wide variety of situations (Ralston & Wilson, 2006).

- *Scenarios move organizations toward a better understanding of the dynamics of change they must deal with.* Being forced to acknowledge the possibility of a variety of futures – rather than a single "most likely" future – organizations have to develop a rationale to explain why the future may follow differing courses. It is not merely a matter of describing different outcomes. Of greater importance is explaining why and how these differing outcomes come about (Ralston & Wilson, 2006).
- *Scenarios provide organizations with clues as to the timing and nature of key moments of change.* This in turn enables them to identify the major leverage points available to them – that is, the points at which they can take action to start, accelerte, or change strategic initiatives. Timing is so often of the essence in taking initiatives, and scenarios give clues as to when the interventions are most likely to succeed (Ralston & Wilson, 2006).
- *Scenarios allow organizations to give consideration to a broader range of opportunities and threats.* This in turn helps organization broaden their horizons and suggest new possibilities for initiatives that might otherwise have been missed (Ralston & Wilson, 2006).
- *Scenarios engage organizations in "what if" thinking which in effect allows them to rehearse the future.* By anticipating different futures and the initiatives that might be taken in each case, organizations can move quickly to responding to

changes in the environment if and when they do occur. The most experienced users of scenarios can cite key periods in their organizations when they were ready to respond to disruptive events or discontinuous changes and their competitors weren't (Ralston & Wilson, 2006).

- *Scenarios reduce an organizations vulnerability to surprises.* It is unrealistic for organizations to believe they can completely eliminate the element of surprise. But it is entirely possible to structure a set of scenarios that captures a much wider range of outcomes than conventional forecasting ever could. Scenarios force organizations to envisage a variety of possible futures and to think through their implications. As a result, they are much better prepared to deal with surprise circumstances (Ralston & Wilson, 2006).
- *Scenarios encourage strategic thinking and serve as input to the strategic plan.* Each scenario presents a set of options, some of which may be opportune only for the conditions of one scenario. However, in total, scenario planning will produce a larger and more diverse set of options for evaluation than traditional forecasting would. The strategy that emerges from scenario planning should exhibit a greater degree of resilience and flexibility because: (1) it will have been tested against a set of scenarios, each presenting a different set of conditions that the strategy might encounter; (2) contingency planning will have developed action plans needed to respond quickly to foreseen possible threats and/or opportunities; and (3) "trigger points" will have been established to set contingency plans in motion as quick response to changes in conditions (Ralston & Wilson, 2006).

- *Scenarios provide a sound basis for continuous monitoring of the environment and strategy adjustment.* Once scenarios have been developed and interpreted for their implications for strategy, they must be tested for validity against the actual course of events as indicated by the output from a trend-monitoring system. Simultaneously, existing scenarios must be alert to the early warning signals of new trends detected by a scanning system that may indicate the need for new scenarios (Ralston & Wilson, 2006).
- *Scenarios have the great merit of transparency.* The reasoning underlying them, and the insights they provide, are readily available to managers seeking to use them. It is this quality which enhances both scenarios' communicability and utility in decision making (Ralston & Wilson, 2006).

Although scenario planning has many strengths for anticipating uncertain futures, the approach also has weaknesses and limitations. Appendix C summarizes some of the main strengths and weaknesses of the scenario planning process.

Use of Scenario-based Planning in Public Health

The environment of public health is unpredictable and constantly changing (Venable et al., 1993). As such, the use of strategic management techniques like scenario planning is becoming increasingly popular in public health management (Venable et al., 1993). Examples from the literature of scenario planning being used in public health are described below.

Exploring Future Prevention and Treatment Methods in Disease Care:

Novo Nordisk, a world leader in diabetes care, used scenario-based planning to explore health system trends and emerging business models for diabetes prevention and treatment (Ringland, 2006). With its headquarters in Denmark, the company employs more than 20 000

people in 78 countries, and markets its products in 179 countries. Novo Nordisk's vision is to defeat diabetes by finding better methods of prevention, detection, and treatment (Ringland, 2006).

Novo Nordisk's scenario process came at a time when it was thought that diabetes might be able to be prevented and controlled. Novo Nordisk set out to explore the possibility of doing just that. However, exploring such a visionary idea required more than conventional strategic planning. As such, it was determined that scenario-based planning would be the best suited method for this project (Ringland, 2006).

The project was divided into three main phases. The first phase was an in-depth environmental scan that produced forecasts of future developments. The second phase involved the creation of four scenarios on the future of diabetes care. The third phase involved the incorporation of the scenarios into the strategic planning process of Novo Nordisk (Ringland, 2006).

The scenarios that were created followed the aspirational model for scenario development. The alpha scenario ***(Diabetes Managed/Business as Usual)*** was developed as an extrapolative scenario based on existing trends. The beta scenario ***(Diabetes Mired/Apocalypse)*** was a hard times scenario that examined possible negative developments in the pharmaceutical industry and diabetes care. The delta scenario ***(Diabetes Overcome/Utopia)*** was a transformational scenario that described the possibilities if business, government and society came together to defeat diabetes. A fourth scenario ***(Diabetes Cured/the Cure)*** was a visionary scenario that began with extrapolative developments from the alpha scenario and added more hopeful advances for diabetes and control (Ringland, 2006).

The aspirational model of scenario development encouraged Novo Nordisk to look not only at expected developments in the pharmaceutical industry and diabetes care, but also at ways in which diabetes care could be transformed by visionary leadership (Ringland, 2006).

Once the scenarios were developed, they were used to identify topics for further exploration that could prepare Novo Nordisk to succeed in the future. Signposts were identified that would validate key forecasts and signal when anticipated changes were underway (Ringland, 2006).

The recommendations from the scenario planning exercise were presented to senior management and then the board of Novo Nordisk. Based on the recommendations, Novo Nordisk confirmed its commitment to being a leader in all phases of diabetes: prevention, detection and treatment. While Novo Nordisk resolved to continue to provide treatments for the hundreds of millions of individuals already with diabetes, it also determined to step up its efforts to become a leading prevention company (Ringland, 2006).

As part of that resolution, Novo Nordisk developed expertise in areas vital to prevention of diabetes. These included:

- Individual risk assessment, bio-monitoring and pharmacogenomics.
- Building knowledge about behaviour shaping and living with diabetes.
- Partnering with key stakeholder groups.
- Supporting health system change to promote prevention (Ringland, 2006).

Based on the findings, the strategic planning of Novo Nordisk was supplemented with an ongoing, regularly scheduled scanning process to monitor drivers and trends identified. These signposts allow Novo Nordisk to better see the occurrence of change so that they can plan appropriately (Ringland, 2006).

Predicting the Future Incidence of Disease and Assessing the Consequences of Failing to Sustain Current Prevention and Control Strategies:

Meima, van Oortmarssen, Richardus, and Habbema (2004) used scenario analysis to investigate the impact of the current strategy for the elimination of leprosy on its incidence and to assess the consequences of failure to sustain this strategy.

The mainstay of current leprosy control is early detection and treatment with multidrug therapy (MDT) (Meima et al., 2004). Since its introduction in 1982, MDT has improved the image of leprosy as a curable disease and has led to increases in the commitment of national health services to finding and treating leprosy patients. In 1991, optimism about the impact of MDT led the World Health Assembly (WHA) to pass a resolution to "eliminate leprosy as a public health problem" by the year 2000 (Meima et al., 2004). This elimination target led to intensive case-finding campaigns called "leprosy elimination campaigns" in the late 1990s. The WHA resolution therefore indirectly caused the increase in global case detection (Meima et al., 2004).

An assumption underlying the elimination strategy was that MDT would reduce transmission by reducing the number of contagious individuals in the community, but evidence to support this assumption was lacking (Meima et al., 2004). As well, data to evaluate the impact of MDT was not readily available because leprosy has a long and variable incubation period, thus decreases in transmission only gradually become evident. Also, declines in case detection may have other causes, such as bacille Calmette-Guerin (BCG) vaccination. BCG vaccination is used against tuberculosis, but appears to afford greater protection against leprosy (Meima et al., 2004).

In their study, Meima et al. used scenarios to assess the impact of the elimination strategy. The scenarios reflected the assumptions made regarding contagiousness, transmission, and bacille Calmette-Guerin (BCG) vaccination. The scenarios were explored using the epidemiological modelling framework known as SIMLEP which was designed for assessing and predicting trends in leprosy. For each scenario, the trends in incidence and case detection up to 2020 were projected for the main countries in which leprosy was endemic during 1985-98. By comparing the projections, the impact of the current MDT – based elimination strategy were explored. An analysis of the sensitivity of the projections for uncertainties in leprosy epidemiology was undertaken. The consequences of relaxation of the elimation strategy beyond 2005 were predicted.

The alternative assumptions regarding contagiousness during incubation of disease, waning of transmission opportunities and BCG vaccination resulted in 16 scenarios: eight without BCG and eight with BCG. Each scenario was fitted to a reference case detection rate (CDR) during 1985-98 (Meima et al., 2004).

The scenario analysis used in this research predicted the incidence of leprosy to decrease beyond 2000 in all scenarios, although the decline may be slow. This was due to the gradual shortening of delays in detection up to 1998, and because of the low relapse rate that occurs with multidrug treatment. The annual decline was a few per cent higher when favourable assumptions were made about protection and coverage of BCG vaccination. Overall, the predicted annual decline in incidences ranged from 2% to 12% (Meima et al., 2004).

This study suggests that early case detection is the key factor in the success of the elimination strategy. The uncertainties about the rate of decline and the adverse effects of longer

detection delays imply that relaxation of leprosy control after 2005 is unjustified. This study suggests a long-term strategy for leprosy control should be adopted (Meima et al., 2004).

In another study conducted by UNAIDS and the South African financial services group Metropolitan, scenarios were used to assess the future impact of HIV/AIDS in Africa and South Africa. The UNAIDS project used scenarios to answer the following key questions: What factors will drive Africa's and the world's responses to the HIV/AIDS epidemic over the next 20 years, and what kind of future will there be for the next generation? How is the crisis perceived and by whom? And will there be both the incentive and capacity to deal with it? The key question that Metropolitan wanted to have answered about the future was: How might HIV and AIDS and our responses shape the future of South Africa over the next 20 years?

The UNAIDS and Metropolitan scenarios highlighted the need for further research in several areas. First, the relationship between HIV/AIDS and democracy. Significant conjectures exist about 'good governance' and how it may act as a kind of social vaccine in combating the pandemic. However, little qualitative or quantitative work has been done in this area in Africa and elsewhere (Fourie, 2007). Second, how the epidemic may undermine a states' ability to govern. Again, little evidence exists to support this claim, although many analysts feel intuitively that it is true (Fourie, 2007).

Third, the scenarios depict the existence of a powerful 'AIDS industry'. This so-called industry directs discourse about the global HIV pandemic and funding for interventions in political ways, and at local levels it might not always serve the interests of people with HIV. Again, little research has addressed this, although there is growing literature on global public-private partnerships and health systems (Fourie, 2007).

Last, the UNAIDS and Metropolitan scenarios highlight the complexity of the HIV pandemic. Although anthropologists and sociologists are doing valuable work in this area, there is insufficient information regarding the socio-cultural drivers of the HIV pandemic (Fourie, 2007).

The results of these scenarios can be used to increase understanding of HIV and AIDS and the forces shaping the future of the epidemic in Africa (Fourie, 2007). The scenarios also raise awareness of existing mental maps about the pandemic and increase the level of understanding between stakeholders by creating a common language about the dilemmas faced and choices that need to be made. Scenarios are useful in the simplicity with which they point out the gaps that need to be addressed, and thus they can creatively assist in drafting strategies and policies for a better future (Fourie, 2007).

Envisioning Future Outbreaks and Pandemics to Evaluate Outbreak Control Managment:

Scenario analysis is a helpful tool for making policy decisions about the design and planning of outbreak control management on a national, regional, or local level. Van Genugten et al. (2003) used scenario analysis to examine the potential impact of pandemic influenza in the Netherlands and to analyze the effects of several (other than influenza vaccine-based) possible interventions in terms of hospitalizations and deaths. This study used a model to estimate the number of hospitalizations and deaths in the Netherlands for different scenarios. It also compared the number of expected hospitalizations and deaths for each of the different intervention scenarios to the number of expected for the nonintervention scenario. The four scenarios considered included:

1) No intervention scenario – this was a "worst-case" situation in which no intervention was possible. The scenario included a pandemic influenza for which

no vaccine was available and only regular care and regularly prescribed antibiotic drugs were provided.

2) Influenza vaccination scenario – in this scenario, when influenza vaccination became available, two possible strategies were considered: 1) vaccination of risk groups including person's ≥ 65 years of age and healthcare workers; and 2) vaccination of the total population.

3) Pneumococcal vaccination scenario – in the absence of a vaccine available at the beginning of a pandemic, the Dutch Health Council recommends providing influenza risk groups with pneumococcal vaccination.

4) Therapeutic use of neuraminidase inhibitors scenario – this scenario included the use of neuraminidase inhibitors. When taken within 48 hours after onset of symptoms and continued for 5 days, neuraminidase inhibitors reduce the duration and seriousness of the influenza infection. However, the effectiveness of neuraminidase inhibitors for preventing hospitalizations and deaths is unknown.

The results of this study indicated that an influenza pandemic with no interventions would result in five times as many influenza-related hospitalizations and deaths as in a regular influenza epidemic with the current degree of vaccination, mostly in person's ≥ 65 years of age (Van Genugten, Heijnen &Jager, 2003).

The influenza vaccination scenario suggested that vaccination may prevent many hospitalizations and deaths. When assuming the age-specific complication rates of a regular epidemic, vaccination of the total population compared to vaccination of healthcare workers and the groups at risk for influenza would do little to avert hospitalizations and deaths. While the

likelihood of an available influenza vaccine in the beginning of a pandemic is low, the next best option seems to be the therapeutic use of neuraminidase inhibitors (Van Genugten et al., 2003).

The pneumococcal vaccination scenario proved to be the least effective because pneumococcal vaccination only prevents one complication of influenza (i.e., invasive pneumococcal infections) (Van Genugten et al., 2003). In contrast to hospitalizations, few deaths might be prevented by pneumococcal vaccination because relatively more excess hospitalizations than deaths are attributable to influenza-related pneumonia. An advantage of this intervention is that pneumococcal vaccination can be done before the pandemic starts since the vaccine is effective in preventing invasive pnemococcal infections for approximately five years (Van Genugten et al., 2003).

Based on the analysis and assumptions of this study, the researchers concluded that after a pandemic has started, the influenza vaccine should be available and administered as quickly as possible following a prioritized scheme (Van Genugten et al., 2003). However, at the start of a pandemic, vaccine is not expected to be available. Therefore, the researchers concluded that the best strategy for preventing hospitalizations and death was a combined strategy of pneumococcal vaccination of risk groups for influenza together with the therapeutic use of neuraminidase inhibitors for all patients with infuenza-like illness (Van Genugten et al., 2003).

The scenario analysis in this study provided information about reducing the effects of a pandemic to a minimum, both regionally and nationally, to those who must prepare for the control of an actual pandemic. The insights from this scenario analysis provide a possible order of magnitude for providing healthcare (Van Genugten et al., 2003). Further, this scenario analysis provided insight into which parameters have the most influence on the outcome variables. If outbreaks of a new, potentially pandemic influenza virus occur abroad and if these

outbreaks yield real information about the attack and complication rates by age group, then these values can be used in this model to update the estimate of the demand for care that can be expected in the Netherlands, nationally, and regionally (Van Genugten et al., 2003).

A Strategic Planning Tool for Use by Local Public Health Departments:

Scenario analysis is a helpful tool for local health departments to use for assessing key health care and organizational issues as well as for public health programming and evaluation (Venable et al., 1993). Scenario planning within a health department causes public health managers to consider how the future may differ from today (i.e., if funding priorities change, new legislation or regulations are adopted, or the economic viabiltiy of a community is threatened with the closing of a major employer) (Neiner et al., 2004). By envisioning alternate futures, those involved in planning look carefully at influences outside the health department, the community, or the state/province in which the health department operates. "Scenarios become a bridge between the existing understanding and new alternative views or frameworks that can be used to interpret what is happening in the outside world" (Van der Heijden, 2005).

In a study by Venable et al. (1993), the Jefferson County Department of Health (JCDH) in Birmingham, Alabama, along with its national, State, and county issues, was used to demonstrate how scenario analysis could be used by a local health department to describe and evaluate its external environment.

In this study, key health care and organizational issues were identified using published sources, focus groups, questionnaires, and personal interviews. The most important of these issues were selected by asking health department managers to evaluate the issues according to their probability of occurrence and likely impact on the health department. The high-probability,

high-impact issues formed the basis of the scenarios produced in this study (Venable et al., 1993).

Two plausible scenarios for the JCDH were used in this study using a challenge and response plot. The first scenario was titled "The Big Squeeze" and the logics for it were as follows:

- Service demands increase with the growth of the AIDS epidemic and of local industrial pollution.
- Funding decreases for public health services. Pressures to reduce the Federal deficit results in reduced appropriations. Private funding becomes necessary but is problematic, given possible conflicts of interest.
- Pressures to reduce costs increase. Cost effective technologies are sought. The largest cost item, labor, rises faster than related revenue because of automatic pay increases.
- A national health policy fails to materialize in any concrete form (Venable et al., 1993).

The second scenario was titled "Shrink or Grow?" The logics were the same as scenario 1 except:

- A national health policy seems likely, but the ultimate form remains in doubt. Further, the role various participants may play is suspect (Venable et al., 1993).

In the case of the JCDH, the first scenario clearly pointed to a growing financial crisis. Strategic responses to this threat included (a) lobbying for more control over labor costs; (b) instituting a well-defined priority system for allocating resources to individual programs; and (c) developing alliances with private funding sources (Venable et al., 1993). The second scenario

evoked the need for contingency plans in the event of a nationalized health system (Venable et al., 1993).

The results of this study demonstrated that through the use of scenario analysis, the managers of the Jefferson County Department of Health began to think more strategically (Venable et al., 1993). Rather than basing decisions merely on tradition and historical roles, managers began making more decisions based on changing community needs and resources. Further, managers became better informed about the changing demands of public health and considered and implemented strategic responses sooner (Venable et al., 1993). Scenario analysis forced managers to become better informed about the activities of other divisions within the health department. The process resulted in reduced parochialism, with managers becoming concerned about the future of the entire organization rather than just their individual divisions (Venable et al., 1993). In summary, this study demonstrated that the use of scenario analysis in health departments will aid in strategic planning, encourage strategic thinking among managers, eliminate or reduce surprise about environmental changes, and improve managerial discussion and communication (Venable et al., 1993).

The results of this study also demonstrated the importance of scenario analysis becoming an integral part of the overall planning function of a health department. The researchers found that top management support and involvement is the key determinant for its success. Only when the process is accepted by senior management and endorsed by department managers can it serve as the foundation for strategic planning (Venable et al., 1993).

In a similar study, Neiner, Howze, and Greaney (2004) applied scenario planning in a public health department, specifically to illustrate the steps in scenario planning for public health use. Alternative futures were created for chronic disease prevention and control with unhealthy

diet and physical inactivity used as the key risk factors. Diet and physical activity are linked closely to the prevention and management of many chronic diseases and conditions, including diabetes, cardiovascular disease, obesity, some cancers, and depression (Neiner et al., 2004). The study revealed scenario planning to be a valuable tool for use in public health to describe possible futures in chronic disease prevention and control (Neiner et al., 2004). It worked especially well in the public health environement because of the existing conditions of high uncertainty and risk (Neiner et al., 2004). The study also showed that scenario planning allows public health stakeholders to define a desired, shared vision of the future in order to prepare for success in their constantly changing environment (Neiner et al., 2004).

Benefits of Scenario-based Planning in Public Health

Scenario planning is best suited for long-range forecasts involving highly complex and uncertain situation where there are few or no reliable data for quantitative models - conditions that characterize most public health issues facing our world today. As such, scenario planning appears to be a particularly well suited for use in public health (Venable et al., 1993).

Scenario planning can add value to public health planning in a variety of ways, whether it be used in research, within a health ministry, within a health department, or with community partners and stakeholders. Many of the benefits of scenario planning in public health are the same as those described for private sector organizations. Some important impacts unique to public health are as follows:

- *Encourages strategic thinking.* The act of pondering scenarios naturally leads to contemplating a response. Scenario planning techniques ask participants to consider how the future may differ from today (e.g., if funding priorities change, new legislation or regulations are adopted, or the economic viability of a

community is threatened with the closing of a major employer) (Neiner et al., 2004). By envisioning alternative futures, those involved with planning look carefully at influences outside the health department, the community, or the state/province in which public health operates. "Scenarios become a bridge between the existing understanding and new alternative views or frameworks that can be used to interpret what is happening in the outside world" (Van der Heijden, 2005). Over time, managers and department heads begin to develop a good feel for their environment and its threats and opportunities - a sixth sense that enables them to judge what to do next. It can make the complexity of most public health problems clearly apparent and to allow interventions on multiple levels and through multiple channels (i.e., an ecological approach) (Venable et al., 1993).

- *Eliminates surprise.* Carefully crafted scenarios serve to acquaint management with the range of possible influences on their environment. Although scenarios are not presumed to model the future with a high degree of precision, they should serve to eliminate surprise about events or trends and reduce uncertainty (Venable et al., 1993).
- *Improves discussion and communication.* Scenarios are the "glue" for individual and group thinking about the future. They allow stakeholders to define a shared vision of a desired future and to determine what that vision means for each of them (Neiner et al., 2004). For example, a scenario in which all youth are physically active may mean that the children will do better academically, will be healthier adults, will be less likely to become involved in criminal activity, or will be less likely to start smoking or using other drugs (Neiner et al., 2004). As public

health managers know, in order to achieve effective public health action, there has to be galvanized political will among the stakeholders. The more aware program planners are of the reasons stakeholders are invested in solving a problem, the better job they can do in coallition management by ensuring that stakeholders achieve their objectives and are recognized for their achievements (Venable et al., 1993).

- *Facilitates thinking "outside of the box"*. Because scenario planning is done in a safe environment, free from constraints that might hamper creative thinking, participants are free to share ideas without criticism or other constraints by the organizational culture or prevailing thinking about an issue (Neiner et al., 2004). Scenario planning encourages participants to challenge assumptions others bring to the planning process that can distort it. Everyone brings assumptions to the table that are never made explicit, yet they significantly influence the direction of planning. Assumptions act as blinders to alternative futures that can slow or stall progress in public health (Neiner et al., 2004). For example, the assumption that tobacco growers were adversaries in the war against youth tobacco use blinded public health advocates for many years to the opportunity to seek common ground to prevent young people from smoking. The assumption that some groups are hard to reach or are not interested in changing their behaviour can become a self-fulfilling prophecy when not carefully considered (Neiner et al., 2004).
- *Transforms "advocacy planning" into "option planning"*. With advocacy planning, those involved often become focused on pushing their own favourite idea, solution, or professional approach and tend to be less interested in being

open to other valuable options (Neiner et al., 2004). Contemplating the possiblity of different futures is vital and allows organizations to move away from a primary focus or idea. Focusing on options and alternatives through scenario planning avoids the pitfalls of advocacy planning (Neiner et al., 2004).

Conclusion

Many of the key public health issues facing our society today involve highly complex issues characterized by conditions of high uncertainty and risk. Examples of such issues include emerging and re-emerging infectious diseases, mutating pathogens, unusual disease outbreaks, chronic disease epidemics, and threats of influenza pandemics. These issues involve and are affected by complicated interactions of many different forces across a wide variety of domains – from economics, politics and social and behavioral changes to biological factors and ecological elements. These issues are too complex and involve too many different interest groups to be solved through narrowly focused, predictive studies (Peterson et al., 2003).

To be responsive in a field as dynamic as public health, public health organizations wishing to be proactive need to adopt strategic management techniques that allow them to be adaptive and flexible to the complex concerns, needs, and opportunities that arise in the field.

Scenario planning is one particular strategic planning method that has shown to work especially well under conditions of high uncertainty and risk. As such, it is a strategic management tool that is particularly well suited for the highly complex and unpredictable field of public health.

Scenario planning as a strategic planning tool can help public health organizations deal with uncertainties by allowing them to move beyond their mental maps and anticipate all possibilities, "think the unthinkable", prepare for the unexpected and even the unlikely (or what

is believed to be so), and develop the flexibility, resilience, and speed to respond. All of these qualities are essential for public health organizations to have in order to successfully respond to the complex issues faced in their confusing, constantly changing environment.

Appendix A

One of the key initial steps in the scenario planning process is to identify the participants who will be involved in the exercise. The participants need not be limited to those individuals whose interests will be directly affected by the scenario planning process. Scenarios depend equally, for their success and utility, on ideas and information from key outside organizations such as clients, community stakeholders, and/or other government agencies.

The following list provides links to some of the key stakeholder groups and government agencies that Ontario public health organizations can use for scenario planning purposes:

Public Health Related Organizations

- Association of Local Public Health Agencies (ALPHA)
- Association of Ontario Health Centres
- Association of Public Health Epidemiologists in Ontario
- Association of Supervisors of Public Health Inspectors of Ontario
- Canadian Cancer Society
- Canadian Centre for Occupational Health and Safety
- Canadian Council for Tobacco Control
- Canadian Food Inspection Agency
- Canadian Healthcare Association
- Canadian Institute of Child Health
- Canadian Institute of Public Health Inspectors
- Canadian Institute of Public Health Inspectors - Ontario Branch
- Canadian Paediatric Society
- Canadian Public Health Association (CPHA)
- Canadian Society for International Health (CSIH)
- Canadian Women's Health Network
- Center for Science in the Public Interest
- Centers for Disease Control and Prevention (CDC)
- Central East Health Information Partnership
- Dietitians of Canada
- Health Canada
- Health Nexus
- Heart & Stroke Foundation of Canada
- Ontario Health Promotion Organizations & Community Health Agencies
- Ontario Healthy Communities Coalition
- Ontario Hospital Association
- Ontario Ministry of Health and Long-Term Care
- Ontario Physical and Health Education Association (OPHEA)
- Ontario Public Health Association (OPHA)
- Public Health Agency of Canada
- Southwest Region Health Information Partnership (SRHIP)
- World Health Organization

Appendix A (Cont'd)

Provincial Health Ministries

- Alberta
- British Columbia
- Manitoba
- New Brunswick
- Newfoundland and Labrador
- Northwest Territories
- Nova Scotia
- Ontario
- Prince Edward Island
- Québec
- Saskatchewan
- Yukon

Health Units in Ontario

- Algoma Health Unit
- Brant County Health Unit
- Grey, Bruce Health Unit
- Chatham-Kent Health Unit
- Regional Municipality of Durham Health Department
- Eastern Ontario Health Unit
- Elgin St. Thomas Public Health
- Haldimand-Norfolk Health Unit
- Haliburton, Kawartha, Pine Ridge
- Halton Regional Health Department
- City of Hamilton, Public Health and Social Services
- Hastings & Prince Edward Counties Health Unit
- Huron County Health Unit
- Kingston, Frontenac, Lennox, Addington
- Leeds, Grenville & Lanark District
- County of Lambton, Community Health Services Department
- Middlesex-London Health Unit
- Muskoka-Parry Sound Health Unit
- Regional Niagara Public Health Department
- North Bay Parry Sound Health Unit
- Northwestern Health Unit
- Ottawa Public Health
- Oxford County Board of Health
- Peel Regional Health Department
- Perth District Health Unit
- Peterborough County-City Health Unit
- Porcupine Health Unit
- Renfrew County & District Health Unit
- Simcoe Muskoka District Health Unit
- Sudbury & District Health Unit
- Thunder Bay District Health Unit
- Timiskaming Health Unit
- Toronto Public Health
- Region of Waterloo, Community Health
- Wellington-Dufferin-Guelph Health Unit
- Windsor-Essex County Health Unit
- York Region Health Services Department

Appendix B

Table 1. Differences between scenarios and forecasts

Scenarios	Forecasts
Possible, plausible futures	Probable futures
Uncertainty based	Based on certain relations
Illustrate risks	Hide risk
Qualitative or quantitative	Quantitative
Needed to know what is decided	Needed to dare to decide
Rarely used	Daily used
Strong in medium to long-term perspective and medium to high uncertainties	Strong in short-term perspective and low degree of uncertainty

(Source: Lindgren et al., 2003)

Appendix C

Table 2. Strengths and weaknesses of scenario planning

Strengths	Weaknesses
Participative – insights are drawn from many sources, thereby adding rich details to envisioned futures and enhancing learning. **Detail Rich** – reaches beyond the constraints of mechanistic models and incorporates contingencies that are difficult to quantify. **Narrative** – produces a series of stories about plausible future states that take into account the dynamic interactions of key stakeholders and the organization's role in creating the future **Broad Scope** – considers multiple plausible scenarios, covering a range of possible contingencies and outcomes; it facilitates diverse perspectives and helps uncover blind spots **Systems Thinking** – encourages learning about the interrelations (including feedback effects) among key environmental variables **Externally-Focused** – provides a framework to envision long-range opportunities and uncertainties in the organization's environment	**Potentially unwieldy** – without logical consistency and rigorous examinations, scenarios can be nothing more than imaginative speculations **Non-quantifiable** – as many of the inputs to a scenario planning process are not quantifiable, the output is likewise not quantifiable **Biases** – envisioned scenarios may reflect current circumstances rather than future possibilities; dominant personalities or groupthink can limit the possibilities considered **Lack of consensus** – because scenario planning allows for divergent perspectives, participants may not converge on shared understandings or a common strategy

(Source: Miller et al., 2003)

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