

# **Using Scenarios in Public Policy**

**Prepared for:**

**Canadian Biotechnology Strategy Task Force**

**M.C. McCracken**

**Informetrica Limited**

**July 1998**

## Using Scenarios in Public Policy

### 1. Background

Concerns and uncertainties about the future are the basis of several industries - public policy development, science fiction publishing, the stock markets, insurance, and economic forecasting. The common elements are the essential unpredictability about the future and the desire of people to either protect themselves against it, to take advantage of it, or simply to understand it.

The use of alternative scenarios as a tool for management has evolved to respond to this need where there are high levels of both complexity and uncertainty. In essence, the future is recognized as inherently uncertain, and multiple views of possible courses are maintained, discussed, and used as plausible, alternative futures for planning and dialogue.

Approaching policy development in government in this fashion is evolving. When faced with substantial uncertainties and complexities there is increasing evidence that the use of "scenario thinking" can produce a better product.

Over the past several years, considerable experience has been gained through the Ottawa Roundtable which addressed issues emerging from the Information Society, including the social contract, the people, culture, and values as well as the changing relationship between the governors and the governed [Rosell et al, 1995].

In addition, several exercises have been conducted in South Africa, the UK's Royal Institute of International Affairs and the European Commission. These sorts of scenarios can be an affirmative methodology to support a "strategic" conversation about the issues and options faced by widely diverse groups.

## 2. Review of the Use of Scenarios

### 2.1. Motivation

#### 2.1.1. Uncertainty and Complexity

In considering the future, two characteristics are present in varying degrees. The first of these is **uncertainty**. There is uncertainty about the ways in which various actors will behave, what changes in institutions will take place, what technological changes will occur, etc.

The second characteristic is that many things are **interdependent**. The way in which one factor - like technology - evolves will influence a number of other factors like business organization, regulatory environments, the pace of globalization, and other major factors.

Indeed, the nature of the interdependencies may not be fully understood or agreed on among students of the problem area. For example, there is wide agreement that higher interest rates can increase interest costs to governments, raise deficits, and increase debt ratios. The notion that higher debt ratios or deficits lead to higher interest rates is not accepted by all groups, particularly not as a necessary link as opposed to a possible policy rule for a central bank. This uncertainty might be used as part of two distinct scenarios of future economic developments.

The underlying model is interdependent, incomplete, nonlinear, and, hence, **complex**. It is this characteristic, coupled with uncertainty, that makes scenarios of value.

Scenarios provide a way for coping with the two characteristics of uncertainty and interdependency, in a manner that focuses the development of scenarios on those thought to be **relevant** to the situation at hand [Schoemaker: 1989].

#### 2.1.2. Communications

In any organization, the on-going challenge is to have people working towards common objectives, with a shared information base, and a framework for thinking about new problems and opportunities. This notion is referred to as the "culture" of the organization.

The dynamic element in the organization is the manner in which the culture changes over time, with changes in objectives, the underlying information base, and new people and responsibilities. This notion is summarized as the "learning organization".

Scenarios, shared across the people in an organization, can serve both to help define the culture of the organization and to help it learn new behaviors under different circumstances.

## 2.2. The "Benefits" Statement

The benefits realized by the use of scenario planning at Shell are nicely summarized by Kees van der Heijden in [Rosell, p.151-5]. These include:

- A better alternative to forecasting, allowing the assessment of strategic decisions against several plausible alternatives, rather than one view. This ensures that information about the inherent uncertainty is maintained throughout the decision-making process.
- The scenario technique forces people to stretch their minds by thinking about the future in a much richer way than forecasting exercises alone.
- Corporate perceptions were enhanced, as people began to interpret information differently than they did before being exposed to scenario planning.
- Scenarios set the context within which subsequent decisions are made, and the interest of senior managers in the scenario process is enhanced.
- The use of scenarios has spread throughout the organization and become part of the decision-making culture.

### 3. An Overview of the Process: Tuning for Public Purposes

The application of scenario planning in the corporate world usually starts with a desire to better understand the operating environment for the corporation in the coming years. The specific areas of uncertainty or key issues become articulated in a scenario agenda. Then a facilitated process is used to examine these key issues, their determinants, the key uncertainties facing the organization, and possible scenarios for crystallizing the uncertainties in the form of plausible stories of the future.

Fortunately, it is not necessary to redesign these tools from scratch for application to governments. Indeed, governments and their associated think tanks initially developed the techniques of scenario planning. As well, there have been a number of applications in government, including in Canada. The excellent book by Steve Rosell, et al [Rosell, 1995] describes the application and results of scenario analysis of the Information Society, and the lessons learned in that process.

A number of examples are covered in Gill Ringland's **Scenario Planning** [Ringland 1998]. As well, there are examples in my notes, "The Development and Use of Scenarios in Economics" [McCracken: 1997].

In the following sections we examine each of the parts of scenario planning more closely, with particular focus on issues affecting the applications in government.

#### 3.1. The Context or Scenario Agenda

In the Netherlands, the Scientific Council for Government Policy [WRR, 9 and 171 ff.] adopted three considerations to drive its choices of actions, couched in the context of its scenarios about future environmental choices. It underlined the importance of:

- 1). The future freedom of action must be guaranteed as far as possible
- 2). The interests of future generations must be visible in the decisions taken
- 3). The measures must be primarily directed towards adjustments in the production (corporate and government) sphere (as opposed to the consumption or persons sphere).

In essence, avoiding irreversible developments with high risks, adopting a long-term perspective, and sequencing actions to start with those groups most able to make the adjustment (the producers) before moving to modification of consumer demand are the values driving their scenario development.

The issues of particular concern were communicated to the group in the form of a request from the government for recommendations on the relationship between the environment, economy, and administration. [WRR: p. 193-5]

Each organization undertaking scenario planning needs to spend some time at the beginning and throughout the process in defining and confirming its underlying ideas, principles, and the formulation of the issues.

As a starting point a SWOT Workshop or structured interviews can be used [VDH, p.138-72]. SWOT is an acronym for Strengths - Weaknesses - Opportunities - Threats, representing the organizational (SW) and environmental (OT) factors that are key to the organization. These exercises help develop the Scenario Agenda - the list of major issues about the external environment which are both important and uncertain.

### **3.2. The Production of Scenarios**

The focus of this step is in the examination of the external environment, based on those items identified as important and uncertain in the development of the Scenario Agenda, including the context or constraints to be kept in mind in the process. One of the major constraints may be time and resources. Issues of the time horizon for the scenarios may be imposed as a constraint as well, particularly if the scenarios are being used as an input to some other processes or are being done in different areas.

#### **3.2.1. Participants**

Scenarios are multi-disciplinary, and so should be the team [VDH, p.183]. As well, the normal criteria of bright, open-minded, able to "think the unthinkable", willing to suffer with "information overload", and good communication skills are desirable.

In the pursuit of the corporate agenda, the underlying belief system in "profit", "capital", and "private interests" is part of the life-blood of the participants. They do not need to be reminded. Rather it is necessary to formally require them to do "stakeholder analysis" to ensure they think outside their organization. It is not uncommon for the scenario teams in business to include "outsiders", from the academic world or other businesses to help avoid "blind spots".

But is something else needed in government applications? In government organizations there can be two "blind spots" that need to be filled in some manner. Governments may not understand the influence of their decisions on the private sector or the behavior of private sector decision-makers unless there is substantial private-sector experience represented on the team. This suggests the addition of

one or more team members from the business community, either someone recently retired from a senior level and/or an active member of the management team from one of the active players. (In Canada we lack the tradition of frequent executive exchange between government and business that could help in this link.)

The second "blind spot" may be something I will call the "public interest". Every bureaucrat of course feels that everything he does is in the "interest of the public", but there may be many constraints on what can be done or even talked about. Increasingly in the US governmental advisory boards are adding people with titles like, "Public Interest Advocate", to act as a balance and "nag" for the group.

This issue could be dropped back to the level of the nature of advisory boards or others that may use scenarios. But one way or another it is important for governments consciously to discuss the need for specific inputs on the public interest. Possible sources for participants might be the academic community or non-governmental organizations.

### 3.2.2. The Scenario Development and Writing Process

The actual facilitated processes are well described in the **Art of the Long View** [Schwartz], by Ringland, and by Kees van der Heijden. It is not our task here to describe this process. Applications within government should not differ appreciably from that in the private sector organizations.

What is noteworthy is that the participants will invariably find the process an enriching learning experience and will find that they adopt a "scenario dialogue" when discussing strategies, outlooks, etc. Indeed, these skills and "thinking processes" can be developed in most scenario exercises. For participants, it represents the "lagniappe" or serendipity of the process. For businesses and governments, these participants can transfer their skills to many different situations.

At the end of the process, there exist two to four fully articulated scenarios. How might they be used?

#### **4. Applications of Scenarios**

It is sometimes thought that everything is done in the private sector or government in direct support of a decision or policy analysis. It turns out that most staff work can at best support future decisions by informing decision-makers (or even planting ideas and questions in their minds) so that when they make a decision it is better informed than would be otherwise the case. The decision has no necessary correlation in time or space with the staff work. Indeed, the decision is likely to be made with or without that work.

Perhaps the most important purpose of a scenario exercise is to build that base of knowledge for decision-makers, along with a clear recognition of the twin dimensions of uncertainty and complexity. If the scenario exercise becomes part of the culture of the organization then this objective is likely to be best served.

##### **4.1. The Spreading of the Conversation**

The core group, who may build the scenarios and learn that way, should be distinguished from the next ring in the circle of people, who must learn "second hand". This can be done by re-running the scenario exercise, but essentially starting with the existing set and explaining the logic of how they were arrived at. Usually they will be "adopted" by this next group, with some extensions to their own circumstances added in for "flavor".

An outer ring of people, including the general public, special-interest groups, single-issue groups, etc. can also be reached through sharing scenarios with them. This allows them to "adopt" a particular scenario as their preferred view, but forces them to recognize the legitimacy of other scenarios, or at least the identification of the driving forces on which they are based.

##### **4.2. Basis for Consensus-Building**

###### **4.2.1. Outside Governments**

A more aggressive approach is to actually use the scenario development process for consensus building [VDH, p.221-3]. In this approach there is little restriction on the issues and it is made clear that the purpose is not to make a decision, but rather "to make exploration trips into an unknown future." This lack of focus is actually a positive element, allowing for a consensus to emerge on what is a "good" and "bad" scenario and on what the underlying worldview is that produces these scenarios.

One application of the scenario process in South Africa was particularly revealing [Kahane, p. 325 ff.]. This took place in 1991 and 1992, right after the release of

Nelson Mandela and prior to the elections in 1994. Although the group did not set out to form a solution, the process ended up identifying a number of scenarios, from which one emerged as a desirable future.

"The participants did not agree to a concrete solution to the country's problems. They reached agreement on some aspects of how South Africa worked, on the complex nature of the crisis, and on some of the possible ways things could turn out. More specifically, they agreed that, given the circumstances then prevailing, certain strongly advocated solutions could not work, including armed revolution, continued minority rule (Ostrich), tightly circumscribed majority rule (Lame Duck), and socialism (Icarus). In this way, the broad outline of a credible successful outcome emerged (Flamingoes)." [Kahane, p.327]

Aside from adding a set of colorful names to the vocabulary, these served as substantive messages to the public. Informal networks and understandings emerged among those participating in the scenario exercises, and resulted in changed ways of thinking.

The key elements that Adam Kahane identified as contributing to the success of the exercise [330-31] and creating shifts in language, thinking, and actions include:

- Logical and fact-based - focus on what might happen, not what should
- Open and informal - anything can be discussed, since it is only "telling stories"
- Inclusive - A variety of perspectives are raised, each valid as a way of seeing the world
- Choice-eliciting - although the future is unpredictable, choices can influence the outcomes
- Constructive - the group is focused on the future possibilities and common future, away from the single solutions often sought today.

#### **4.2.2. Inside Governments**

A shared scenario, in which members of various departments participate is a good starting point for joint involvement and shared "ownership". It is likely that there are many different views within government as well, particularly if the area is a new one. In some sense, scenarios "reward diversity" of views within government as well as helping to maintain it.

What are the available tools? Some can be through the private sector, others are only in hands of government (e.g., regulation, taxes, international agreements). Boundaries may be broader for government (e.g., national versus the regional, private sector. Or international versus just national.)

### **4.3. Improving the Planning Process**

Perhaps the most sophisticated application of scenario development is their full integration into the strategic planning processes of an organization. Kees van der Heijden details this approach and its benefits to Shell. It is very worthwhile to consider this framework, and additional twists that may be needed for governments. As an example, the role of the "business idea" can be an important concept to focus the scenario-building exercise around the concerns of management. The use of scenarios to evaluate policy options is also both a check on the scenario process as well as a concrete application.

#### **4.3.1. The Business Idea**

"... the Business Idea is the organization's mental model of the forces behind its current and future success." [VDH, 59]. If the business idea is their unique competencies and their enhancement, what is the unifying idea for public sector applications? Does it flow from the department or branch of government? Or does it go back to a representative government through parliament? Is the "success" to be expressed as a "public purpose served"?

#### **4.3.2. Testing Strategy Options**

By checking various options against the set of scenarios it is possible to create a "Business Idea for the future" or strategic vision [VDH, P.137]. This strategic vision then must be communicated to all affected to ensure that corporate actions are appropriate and congruent with that vision. An analysis of the impact on stakeholders is also an integral part of the evaluation of options.

The application of scenario building to planning within government is analogous to a multi-product firm, with many branches or divisions. The advice generally given is to start with scenario planning at the "business" or branch level, with subsequent integration at higher levels (i.e., the corporation or government-wide). This links closely to the notion of a strategy for the enterprise, a master plan for the integration of the parts, and coherence of the parts through project planning, budget planning, and appraisal. See [VDH, p.249-72] on this aspect.

But at this point in time, both scenario development and strategic planning have not evolved far enough within most organizations to suggest that they be "twinned" into an all encompassing framework for strategy.

## 5. Lessons Learned about Scenarios

### 5.1. How to have a successful experience with scenario building

Start with thinking people, with **open minds**. Use a process that continually tries to widen the thinking, until there is a shared sense that the flow can begin to focus on the articulation of scenarios. **Dialogue** is crucial, since the challenge is to have the entire group participate and to gain the synergy from that process.

Recognize that scenario planning is an **iterative** process. It is like other intellectual activities that require continuous updating in the light of new information, better understanding of underlying linkages, changes in the strategic questions, etc.

**Evaluate** past scenarios in order to determine what areas were missed, what was right, what was learned subsequently, etc. By formalizing the evaluation or review process it is more likely to be done and shared with others. It is part of the learning process.

**Process** does matter. Indeed, it is the process that yields a different product or outcome from scenario planning compared to other "meetings of the minds". This process does take time, both in days committed to interaction, and calendar time between steps for minds "to sort" the information, to do additional background reading, and to re-invigorate before the next step. **Perseverance and dedication** by participants and facilitators best describe the requirements for success.

Scenario planners should focus on ensuring that their exercise has identified the **relevant problem**, and that problem remains in participants' minds throughout the exercise. Other characteristics of good scenarios include plausibility, internal consistency, and breadth, which are challenging to existing mindsets [Rosell, p.161].

### 5.2. Potential Problem Areas

The use of scenarios in organizations has not been successful in all cases. In each case, however, there is something to be learned even if it is what not to do the next time around.

**Closed Minds, No Dialogue.** If the scenario planners come to the table with pre-conceived idea of a particular story that they wanted to tell, [VDH, p.43] then this short-circuits the process and almost ensures failure. If several participants try this approach, then all you end up with is a set of unrelated, competing views, but without any learning or conversation being achieved. As one pundit described it,

"These are scenes, but not scenarios." The loss is the failure to identify the key strategic issue, the driving forces, and the uncertainties.

**Bad Timing.** Undertaking strategic planning in the middle of a crisis is not likely to be successful. The inability to move back and forth from fighting the fires to the consideration of the future design possibilities for the next building limits the utility. The ideal is to have forearmed the decision-makers with scenarios that can be referred to during the crisis. Another approach is to set aside a team to develop a set of scenarios, but keep them out of the current crisis management.

**You didn't forecast the future!** Even though scenario planning is used precisely because the future is not forecastable, it is easy to slip into allowing yourself to be evaluated on the basis of how close the world tracks with some scenario made a number of years ago.

**Recycled scenarios may not be useful.** There is a strong temptation to use an existing set of scenarios for a new problem area or a different organizational setting. This is likely to result in disappointments unless there is a strong congruence between the Big Question that drove the first set of scenarios and the question at hand in the new application. See the scenario summaries in [McCracken] or [Ringland] and ask yourself how applicable they would be to your specific problem.

## 6. Specific issues regarding Biotech

Herman Kahn ended his book exploring the next two hundred years [Kahn: p.225 ff.] with musings about the effects of biotech on human beings:

"The fundamental physiological and psychological aspects of human life are being altered today, and will be further changed tomorrow. ... the great diseases of the past have been all but eliminated ... death increasingly will be mainly the result of either accident or the simple wearing out of vital organs. As man progresses further in genetic research, he will move closer to the time when he will be able to influence the design of his offspring, perhaps even producing them ectogenetically. ...

How will all of these potential changes, many of which are quite likely, affect human beings, for whom work - in the post-industrial era - will be an activity of relatively short duration, and of primarily a self-serving nature? ... What kind of life will a genetically engineered, vital-organ-replaceable, mental-state-adjustable, computer-robot-assisted human being want to live?

...The post-industrial world we foresee will be one of increased abundance ... But it will also be one of enormous power to direct and manipulate man and nature ... Who will direct and manipulate, and to what ends?"

What is interesting is the fact that this was written over 20 years ago, demonstrating that a useful scenario may inform for some time into the future. It also underlines the importance of biotech developments in influencing the future paths of humankind.

### 6.1. Science

#### 6.1.1. A restricted knowledge base

Issues in this area when discussed across departments and with various publics will require some educational material and/or briefings to bring people up to a common base of knowledge regarding biotechnology. If this is not done, then there may be no shared ideas of what is possible, what is a real threat, and what is simply "bad science".

#### 6.1.2. Is there a shared base of fact?

Rifkin identifies two "models" - the reductionist and the integrative approach. In his words:

"Many of today's best-known molecular biologists are heirs to the Baconian tradition. They see the world in reductionist terms, and see themselves as grand engineers, continually editing and recombining the genetic components of life into compliant organisms designed for human service. In their research they often favor isolation over integration, detachment over engagement, and the use of force over stewardship and nurturance.

Other more ecologically inclined biologists have developed a more integrative, systemic approach to nature. The ecological sciences view nature as a seamless web of symbiotic relationships embedded in larger living communities that together make up a single organism - the biosphere. Ecologists favor more subtle forms of biological manipulation designed to enhance rather than to sever natural relationships, always with an eye toward preserving biological diversity." [Rifkin. p.69]

Is this a different view or more akin to the microeconomic and macroeconomic distinction of economics? Do both groups push the science forward, or should only one view prevail?

### **6.2. Ethics - Scenarios based on different value systems**

Would the choice of scenarios vary if you were the "Gamekeeper for the Gods", in which you treated each species as of equal value or importance? Would a developed country and less-developed country consider the same scenarios? If not, then might this indicate too narrow a framework. Would other specialist groups see the problem differently (anthropologists, sociologists, political scientists, biologists, MBAs, economists, elected officials, etc.)?

### **6.3. Small probabilities - "Wild Cards"**

Most proponents of scenarios stress the importance of equally "plausible" scenarios, since it is deemed desirable that each be treated as "equal" when evaluating various actions against the scenario. But these scenarios need not be "likely" in any probabilistic sense. What is important is that the scenarios be treated as equally likely, for purposes of strategic conversations, evaluation of options, and for understanding the linkages to stakeholders. Although the various scenarios between BLUE and RED in the 1960s involving varying levels of thermonuclear exchange were hoped to be highly improbable, they were each treated seriously. Indeed, this may have helped these scenarios to not come to pass, most fortunately.

It may be useful to develop one or more "worst case" scenarios, to foster discussion, even if only to provide comfort that such "unthinkable" visions are indeed being considered. It may be sufficient to simply provide a running

summary of various fictional accounts, such as **Jurassic Park** (Michael Crichton) and **Chromosome 6** (Robin Cook), perhaps with an added analysis from a group of scientists or bureaucrats as to why this is "science fiction". Such scenarios are sometimes referred to as "challenge" scenarios [VDH, p.217] and can be useful learning devices in the early stages of scenario development.

## 7. Thoughts about Possible Actions

If a scenario planning process is to be undertaken on an on-going basis, then there are some activities that might usefully be started now that will have lasting value. This will be even more important if a public conversation is to take place over several years and involving many different people.

### 7.1. Organize Information for Biotech

The data in any area can be organized at three levels, with enhanced knowledge at each level: [VDH; p.96 ff.]

- The events
- The trends or patterns
- The underlying structure

Developing causal structures of current behavior for purposes of extrapolating future behavior is an essential part of the scenario process. This requires a flow of information about important events, the analysis of these events for trends and patterns, and the development of the "models" or "structure" at the third level of knowledge.

Another block of information of value would be a list of expected decisions in the biotech area that are expected over the next decade, along with a list of key past decisions. This list could be used as a starting point for "clustering", identification of themes for backgrounders, identification of event types to be monitored, etc.

### 7.2. Generate Biotech Scenarios

Select a multi-department, multi-disciplinary team of people to participate in a scenario development process over a number of months. The outputs would include both learning and decision scenarios.

**Learning Scenarios.** The Big Question: How does Canadian industry and society evolve over the next twenty-five years in a world with major technological and regulatory developments in the biotech area? A relatively focused exercise should be undertaken with an objective of producing a report with several scenarios in which varying uncertainties with regard to biotech developments and regulation are featured.

**Decision Scenarios.** The learning scenarios can be refined to create a set of plausible futures, which can, **as a set**, be used to consider alternative strategies or

decisions. These refined scenarios can then be used to extend the discussion within government and with the various publics.

### **7.3 The Strategic Conversations**

"Strategic conversations" represent one of the uses of scenarios. In the case of biotech, it is expected that such conversations will take place within government and between governments and other stakeholders.

Within government, the scenarios can be shared with other interested groups, both for them to gain an understanding of the content of the scenarios, but also to pick up the "vocabulary" around the scenarios for subsequent use in joint efforts.

With the public, the process is likely to start with a large number of "bilateral" meetings between government representatives and various organized groups, such as trade associations, professional groups, community groups, etc.

A "conversation" represents one of the **least** involved consultation processes between government and the public. (A more detailed discussion of consultation processes can be found in McCracken [1996], CCCCCP.) The objective of the conversation is to share understanding of the issues around biotech (ethics, regulatory, science, intellectual property, hazards, etc.) such that the public is receptive to sensible policies and understands the basis for decisions that are taken.

By using scenarios, the discussion is kept on the plane of "what might happen" rather than dealing with current policy challenges. This allows a more wide-ranging discussion without having people fighting specific policies or regulations.

This does not mean that participants may not take strong positions. Rather the purpose of the scenario backdrop is to ensure that they recognize the driving forces and the uncertainties around the scenarios and, at least, see that other views are also plausible, even if they are committed to a particular view of the future and of the underlying processes.

## 8. An Ending Thought

Although scenarios have been used in the Canadian government in the past, I must say that the results to date seem disappointing. Why is this? Some hypotheses might include:

- Lack of perseverance
- Lack of resources - time, dollars
- Lack of a strong desire to improve organizational strategy
- Success of individual not tied to success of department or government

In a more positive vein, if we decide to use these tools what can we do to increase the likelihood of their success? How do we ensure the commitment, funding, and subsequent use to make a difference?

The area of biotech promises to be a major new technology, with effects to match or exceed those of ICT. It will be a major area for government policy for decades to come, with dimensions of intellectual property, industrial development, health, safety, and international linkages being prominent.

**References**

Kees van der Heijden, **Scenarios: The Art of Strategic Conversation** (John Wiley & Sons: 1996)

Herman Kahn, William Brown, and Leon Martel, **The Next Two Hundred Years** (William Morrow & Co., Inc.: 1976)

Adam Kahane, "Imagining South Africa's Future: How Scenarios Helped Discover Common Ground", Chapter 18 in Liam Fahey and Robert M. Randall, **Learning from the Future: Competitive Foresight Scenarios** (John Wiley and Sons: 1998)

M.C. McCracken, "The Development and Use of Scenarios in Economics" (Informetrica Limited: 1997)

M.C. McCracken, "Public and Private Consultation Processes" (Informetrica Limited: 1997)

Henry Mintzberg, **The Rise and Fall of Strategic Planning** (The Free Press, 1994)

Netherlands Scientific Council for Government Policy, **Sustained Risks: A Lasting Phenomenon** (Reports to the Government #44: 1995) also referred to as WRR - Wetenschappelijke Raad voor het Regeringsbeleid.

Jeremy Rifkin, "God in a Labcoat", **Utne Reader** (May-June 1998), pp. 66 ff.

Gill Ringland, **Scenario Planning: Managing for the Future** (John Wiley & Sons: 1998)

Steven A. Rosell et al, **Changing Maps: Governing in a World of Rapid Change** (Carleton University Press: 1995)

Paul J. H. Schoemaker, "Scenario Thinking" (University of Chicago, Graduate School of Business: August 1989)

Peter Schwartz, **The Art of the Long View** (Doubleday: 1991)