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## **Advantages and disadvantages of scenario approaches for strategic foresight**

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**Abstract:** Scenarios, as a prime technique of future studies, have long been used by government planners, corporate managers and military analysts as powerful tools to aid in decision making in the face of uncertainty. The idea behind them is to establish thinking about possible futures which can minimise surprises and broaden the span of managers' thinking about different possibilities. Today the question of what scenarios are is unclear except with regard to one point - they have become extremely popular. This paper attempts to shed light on differences in scenario approaches. It will describe the origin of scenarios and the development of different understandings and purposes for managers. Categories are developed to compare the different ways scenarios are performed. Finally, the advantages and disadvantages of scenario approaches are analysed.

**Keywords:** scenario technique; scenario building; innovation strategy; technology planning.

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### **1 Introduction**

Scenarios should provide strategists with various possible futures and not forecast the future. The purpose of a scenario is at a meta level, since the scenario usually does not

speak for itself in terms of its purpose. Scenarios, as a prime technique for future studies, have long been used by government planners, corporate managers and military analysts as powerful tools to aid in decision making in the face of uncertainty. In practice, scenarios resemble a set of stories built around carefully constructed plots. Such stories can express multiple perspectives on complex events, with the scenarios themselves giving meaning to these events.

Today the question of what scenarios are is unclear except with regard to one point—they have become extremely popular. This paper attempts to shed light on differences in scenario approaches. It will describe the origin of scenarios (Section 2) and the development of different understandings and purposes (Section 3). Different types of scenarios are described in Section 4 and an overview on selected scenario techniques is given in Section 5. Finally, criteria for the quality and the evaluation of scenario techniques are developed (Section 6). Advantages and disadvantages are discussed in Section 7 in order to give innovation managers hints on the limits of scenarios. The paper is based on an in-depth literature analysis. It is a glance at our current research on strategic foresight, which will be continued in the future.

## **2 Origin of scenarios**

Research on the future has heterogeneous intellectual roots and strands, including operations research, scenario planning, prospective and strategic management. Its conceptual history is complex and has been influenced by a number of companies, institutes and schools, e.g. the RAND Corporation, Stanford Research Institute, Shell, SEMA Metra Consulting Group and many others (Godet, 1987; Ringland, 1998; van der Heijden, 1996). Futures research has its origin in early systems thinking in the 1940s, where it was linked mainly to safety issues and strategic analysis (Berkhout and Hertin, 2002).

The scenario planning concept first emerged following World War II, as a method for military planning. The US Air Force tried to imagine what its opponents might do and to prepare alternative strategies. The big push for scenarios as an organisational or institutional model for clarifying ideas about the future goes back to the Department of Defense in the 1950s (Daum, 2001). In the 1960s, Herman Kahn, who had been part of the Air Force effort, refined scenarios as a tool for business prognostication. He became one of The USA's top futurists. Kahn's monumental contribution to military thinking was his escalation ladder. There are distinct variations or stages of what may occur between 'war' and 'no war' under different circumstances. His escalation ladder described a sample of those steps. To lend reality to those steps one has to have detailed accounts on how they may arise, be responded to, and resolved to create a new terminal or baseline situation. That can only be done by dealing with complexity. The human mind is capable of profound integration, but that is laborious. The great value of a scenario is being able to take complex elements and weave them into a story which is coherent, systematic, comprehensive, and plausible. The military had great experience doing that, thanks to Kahn. They also developed the scenario war game as an equally valuable contribution to understanding conflicts. The most interesting ones from the scenario point of view are the policy games in which the military, the State Department and other government officials play different roles in situations that are thought to be realistically plausible. They will go through several rounds of interaction. In the scenarios, no one has total knowledge of the

situation with the exception of a central person/ team that plays the godlike role of watching and interpreting the changing situation based on the responses of actors in the scenario (Coates, 2000, pp.115–123).

In the early 1970s scenarios reached a new dimension, with the work of Pierre Wack, who was a planner in the London office of Royal Dutch/ Shell in a newly formed department called 'Group Planning'. The new wave of interest in scenario planning is often explained by the traumatic effect of the oil crisis in 1973 that draw attention to the possibility of major unexpected changes in the international economic system (Berkhout and Hertin, 2002, p.39). Pierre Wack and other planners were looking for events that might affect the price of oil. And they found several significant events that were in the air. One was that the USA was beginning to exhaust its oil reserves. At the same time US demand for oil was steadily rising. And the emerging Organisation of Petroleum Exporting Countries (OPEC) was showing signs of flexing its political muscle. Most of these countries were Islamic, and they bitterly resented Western support of Israel after the 1967 six-day Arab-Israeli war. Looking at this situation, the planning team realised that Arabs could demand much higher prices for their oil and there was every reason that they would. It seemed likely to happen before 1975 when old oil price agreements were due to be renegotiated. So Pierre Wack and his team wrote up two scenarios – each a complete set of stories about the future, with tables of projected price figures. The first story presented the usual opinion at Shell: that the oil price would stay somehow stable. But in order for that to happen, a miracle would have to occur. New oil fields, for example, might have to appear in non-Arab countries. The second scenario looked at another future – an oil price crisis sparked by OPEC. But after presenting these scenarios to Shell's management, there was no change in behaviour. Pierre Wack went one step further and described for the scenarios the full ramifications of possible oil price shocks and he tried to make people feel those shocks through the scenario. He warned management, that the oil industry might become a low growth industry, that OPEC countries would take over Shell's oil fields. He described the forces in the world, and what sorts of influences those forces had to have. This helped Shell's managers to imagine the decisions they might have to make as a result. And it was just in time. In October 1973, after the Yom Kippur war in the Middle East, there was an oil price shock and not one of the major oil companies, except Shell, was prepared for the change. The company's management responded quickly and in the following years, Shell moved from one of the smallest of the seven large oil companies to the second in size and the number one in profitability. The example of Shell should make clear the purpose of scenario planning: to help managers to change their subjective view of reality, to match it up more closely with reality as it is and possible futures. The end result is not an accurate picture of forecast, but better decisions about possible futures (which is then called 'foresight') (Daum, 2001). Scenario building and planning was further developed for management purposes, for example through the works of Peter Schwartz and colleagues from the Global Business Network (Sohail, 2002, p.2) or other authors mainly with a background from companies (e.g. Van der Heijden, 1996; Ringland, 1998; Slaughter, 1996).

Public attention towards the use of scenarios was initially alerted by the publication of the highly contentious *The Limits to Growth* by Dennis and Donella Meadows (1972) early professional impetus was provided by Jay Ogilvy, Paul Hawken and Peter Schwartz in their seminal text *Seven Tomorrows* (1980) and wider acceptance was gained by the work of Michel Godet with a particular emphasis in his contributions on morphological

analysis (1987 and 1995) in France, Garrett (1966) in the USA and Robertson (1983) in the UK (Ratcliffe, 1999).

### **3 Definitions and purposes of scenarios**

The term scenario describes a fuzzy concept that is used and misused, with various shades of meanings. Scenario can be understood as

“...the generic name for different approaches such as the SRI’s (formerly the Stanford Research Institute) strategic planning scenarios, Godet’s scenario method and Battelle’s scenario technique. In theory, scenarios are a synthesis of different paths (events and actors’ strategies) that lead to possible futures. In practice, scenarios often merely describe particular sets of events or variables” (Roubelat, 2000, p.4).

The idea behind this construct is to establish future planning which can minimise surprises and broaden the span of managers’ thinking about different possibilities (e.g. Porter, 1985; Wack, 1985; Millet, 1988; Tenaglia, Noonan, 1992; Mason, 1994; Schriefer, 1995; Elington Trisogolio, 1996).

There are different definitions about scenarios. The following ones are examples and the list is far from complete. Godet and Roubelat (1996, p.166) understand a scenario as a description of a future situation and the course of events which allows one to move forward from the original situation to the future. Sohail (2002) states that scenarios are the favourite tool in futures studies. For some, they help forecast the future, while for others, they clarify alternatives. Scenarios are useful because they give us distance from the present, open up the future and allow the creation of alternative futures.

Warfield (1996) of the Battelle Institute looks at scenarios as a :

“... narrative description of a possible state of affairs or development over time. It can be very useful to communicate speculative thoughts about future developments to elicit discussion and feedback, and to stimulate the imagination. Scenarios generally are based on quantitative expert information, but may include qualitative information as well.”

Scenarios can be used to obtain a number of different ends: Scenarios are internally coherent pictures of possible futures. They are among the most useful tools and have a wide range of uses. For example, they can dramatise trends and alternatives, explore the impacts and implications of decisions, choices, strategies, and provide insights into cause-and-effect sequences (Slaughter, 2000, p.117).

Some authors differentiate between scenario building and scenario planning. Building scenarios means speculating about the uncertainty surrounding the future: basically it means envisaging a few different possible future outcomes for the situation under scrutiny or, in the words of the Swedish neurobiologist David Ingvar, to create ‘memories of the future’ (Schwartz, 1996). Scenario building is the necessary foundation for scenario planning and often both are linked to each other. Scenario planning can be understood as integrating scenarios permanently in the company’s planning process. Wilkinson (1996) states that:

“... scenario planning can prepare us in the same way that it prepares corporate executives: it helps us understand the uncertainties that lie before us, and what they might mean. It helps us ‘rehearse’ our response to those possible futures. And it helps us spot them as they begin to unfold.”

Scenario planning can be regarded as a tool for improving decision making against a background of possible future environments. It is an internally consistent account of how the business environment and external environment in which an organisation operates might develop over time. There is also an understanding that:

“... an organisation might build up a range of scenarios over time to make sense of diverse but interconnected factors in the external environment and to deal with critical uncertainties” (ETTE, 2002, p.12).

Ratcliffe (2002, p.4) summarised the following main characteristics of scenarios:

- present alternative images instead of extrapolating trends from the present
- embrace qualitative perspectives as well as quantitative data
- allow for sharp discontinuities to be evaluated
- require decision makers to question their basic assumptions
- create a learning organisation possessing a common vocabulary and an effective basis for communicating complex – sometimes paradoxical – conditions/ options.

According to Ratcliffe (1999) a primary purpose of scenarios is to create holistic, integrated images of how the future might evolve. These images, in turn, become the context for planning, a testing ground for ideas, or the stimulus for new development. Further, scenarios should inform decision makers and influence as well as enhance decision making. In this context, Fahey and Randell (1998) suggest that the purpose of scenario building is to:

- augment understanding by helping to see what possible futures might look like, how they might come about, and why this might happen
- produce new decisions by forcing fresh considerations to surface
- reframe existing decisions by providing a new context for decisions
- identify contingent decisions by exploring what an organisation might do if certain circumstances arise.

Neilson and Wagner (2000, pp.10–11) highlight that scenarios intend to provoke strategic thought by removing obstacles to creative thinking and aim to:

- anticipate future threats and opportunities
- develop multiple futures based on optimistic and pessimistic projections of past events
- foster strategic thinking and learning
- facilitate the art of strategic conversation
- envisage a future state
- challenge or dispel assumptions about the ‘official’ future,

- create a rallying point
- provide leadership for new initiatives or direction
- create options for decision making
- create frameworks for a shared vision of the future to influence organisational and individual behaviour
- create an internal or external communication channel that transcends organisational boundaries, time and space.

#### **4 Different types of scenarios**

There are many different types of scenarios and ways of classifying them (e.g. van Notten *et al.*, 2003 or Martelli, 2001). The creative and communicative aspects are in use and different authors refer to the decision and action approach. Maleska (1995, p.86) pointed out the ‘mission scenarios’, ‘issues scenarios’ and ‘action scenarios’. Under the aspect of action there are forward scenarios and backward scenarios (Steinmüller, 1997, p.55). Based on Godet and Roubelat (1996, p.166) scenarios can present the results of forecasts in a consistent and compelling way. Scenarios can be exploratory or normative. ‘Exploratory’ means starting from past and present trends and leading to a realisable future. Anticipatory or normative means built up on the basis of different visions of the future; they may be either desired or, on the contrary, feared. The exploratory scenarios may, moreover, be trend-driven or contrasted, depending on whether they incorporate the most likely or unlikely changes. Exploratory scenarios are based on four assumptions (Berkhout and Hertin, 2002, p.39):

- the future is not only a continuation of past relationships and dynamics but can also be shaped by human choice and action
- the future cannot be foreseen, however, exploration of the future can inform the decisions of the present
- there is not one possible future only, uncertainty calls for a variety of futures mapping a ‘possibility space’
- the development of scenarios involves both rational analysis and subjective judgement; it therefore requires interactive and participative methods.

Alternatively, van der Heijden makes a distinction between internal and external scenarios. Internal scenarios are about the future at an individual level where an action option is linked to a personal goal (“...if I do this then this will happen which will lead to that and so on until I achieve my objective of A”, van der Heijden, 1996, p.5). External scenarios are mental models of the external world by which ranges of possible future developments are projected. Dammers (2000) develops different types of scenarios according to five variables (Table 1).

**Table 1** Different types of scenario thinking acc. to variables (Dammers, 2000)

<i>Variables</i>	<i>Type of Scenarios</i>
Breadth of the scenario topic	Sectoral vs. multi-sectoral scenarios
Level of aggregation	Micro, meso and macro scenarios
Direction of time (from past to future or the other way round)	Projective vs. prospective scenarios
Amount of exploration	Dominant, limited explorative, and highly explorative scenarios
Focus of action	Environmental vs. policy scenarios

Steinmüller (1997) categorises scenarios according to different ‘aspects’ (see Table 2).

**Table 2** Different types of scenario thinking acc. to aspects (Steinmüller, 1997, pp.54–56)

<i>Aspects</i>	<i>Type of Scenarios</i>
Aspect of Representation	Complete formulated scenarios Sketchy scenarios
Aspect of Topic	Global scenarios Problem specific scenarios
Aspect of Quantification	Semi-quantitative scenarios Qualitative scenarios
Aspect of Time	Situation scenarios Process scenarios Short-term scenarios Mid-term scenarios Long-term scenarios Scenarios without time purchase
Aspect of Function in the Research Process	Entrance scenarios Exploratory scenarios Goal-setting scenarios Result-orientated scenarios
Aspect of Semiotics	Formal scenarios (the written text is the scenario.) Intentional scenarios (the text is not the scenario, but the mental future draft.)

Another way of differentiating between types of scenarios was developed by Fahey and Randell (1998 in Ratcliffe, 1999, p.6). They differentiate between:

- *Global Scenarios*: Which offer leaders a guide to a number of distinctive future environments where each has different implications for long-term investment, operating decisions and option analysis.
- *Industry scenarios*: Which enable managers to identify plausible future states of an industry and differences between them, to examine how these distinct industry states might evolve, and to determine what an organisation would have to do to win within each industrial future.

- *Competitor scenarios*: Which offer a unique method of identifying and testing plausible competitor strategy alternatives in various circumstances.
- *Technology scenarios*: Which help managers to make better technological decisions by better understanding the opportunities, risks and choices in preparing for a dynamic, turbulent and uncertain future market.

In terms of methodological approaches, three forms of scenario planning are identified (see Huss and Honton, 1987; Martelli, 2001):

- *Intuitive Logics*: First described by Wack (1985) and developed by SRI, Global Business Network, and Shell, it is the most appropriate way to use every available piece of information about the future; it generates new ideas and it can help in identifying the underlying patterns. On the other hand intuitive logic is strictly connected with the experts who work on the scenario, the techniques are assembled together in the most varied way and consequently it is difficult to check the validity of the particular approach adopted from a scientific point of view.
- *Trend Impact Analysis*: Used by the Future Group, it is a combination of statistical extrapolations with probabilities: the most recent update is probably due to Gordon (1994). The methodology has the advantage of being formalised. At the same time it does not rule out creative thinking, as the choice of the factors influencing the development of a given trend is in its essence a creative procedure. Further, trend analysis has its shortcomings: it can be used only if long, detailed and reliable time series of data are available and if the researchers using it have a background in statistical and probability theory. For this reason, it is used by a minority of experts.
- *Cross-Impact Analysis*: Employed by Battelle with BASIC (Batelle Scenario Inputs to Corporate Strategies) and owing much to Godet (1987), it is probably the methodology most directly connected with the use of scenarios. The great advantage of cross-impact analysis is that it is a highly formalised method, which allows control of the process. The disadvantage is that if it is not contained within certain limits it is the formalisation itself which goes out of control and gains an excessive edge on the usefulness and reliability of the content. A number of experts is quite positive on the method, pointing out that it is often a good point of entry to begin with scenarios, that it arouses the interest of people of various backgrounds and that it is very good for stimulating new ideas, even if one does not bother to go as far as extracting projections out of it.

## 5 Selected scenario techniques in practice

Despite their story-like quality scenarios follow systematic and recognisable steps. The process is highly interactive, intense and imaginative. There are different approaches towards how to perform scenarios and how to use the scenario technique. But some aspects are quite similar in the different concepts. Usually, it starts by clarifying the decisions to be made, rigorously challenging the mental maps that shape people's perceptions, and hunting and gathering information, from various sources. The next steps are more analytical: identifying the driving forces, the predetermined elements and the critical uncertainties. Subsequently three or four thoughtfully composed scenario plots,

each representing a plausible alternative future, are developed. The deeper structure and systems behind the scenario stories, and their underlying logics, are elaborated to explain them and reveal their crucial differences. Finally, the key events or turning points, which would channel the future towards one scenario rather than another are identified (see Ratcliffe, 2002, p.4). Phelps, Chan and Kapsalis (1998) suggest that scenarios in general are built according to four stages:

- defining scope
- database construction
- building scenarios
- choosing strategic options.

Numerous methods have been developed to create scenarios, ranging from simplistic to complex, qualitative to quantitative. While each approach is not feasible to explain in detail, a brief description of several approaches is offered in Table 3 and the following sub-chapters.

### *5.1 The eight-step scenario process of von Reibnitz*

Ute von Reibnitz – together with Horst Geschka (who among others has specialised in technology scenarios, see e.g. Geschka, Schaufele and Zimmer, 2001) – introduced a special scenario method in German-speaking countries. She argues that the ability to create different futures allows planners to deal with scenarios that fall between two extremes. Von Reibnitz (1988) describes in her book the scenario technique in eight steps (see Table 3).

After an actual analysis (step 1), in which a strengths and weaknesses profile is drawn up, it is then a matter of acquiring knowledge of the system dynamics of the associated area (step 2). An advantage of the scenario technique comes in useful here in the fact that minority votes can also be taken into account. This part of the scenario (step 3) calls for particularly visionary thinking ability. Descriptors are looked for within the different areas of influence. In a further step (step 4), these future developments are checked against each other for consistency – using a consistency matrix. In view of the mostly large number of descriptors, the scenarios are calculated using computer programmes (e.g. Szeno-Plan, Scenario-Manager<sup>TM</sup>, INKA). In the scenario interpretation (step 5) the scenarios are interpreted and described in an imaginative way, their system dynamics and changes in the future have to be analysed. In the analysis of the consequences (step 6), it is a question of deducing possible opportunities and risks, for the objective of investigation for each descriptor on the basis of the two scenarios. Then measures are drawn up for these opportunities and risks of how opportunities could be utilised and how risks could not only be minimised, but above all transformed into opportunities. The great difference between classical forecasting techniques and the scenario technique becomes clear when so-called ‘wild-cards’ or ‘disruptive events’ are included in the scenario (step 7). Trends are diagnosed, not predicted. This is the reason why individual events with a low probability of occurrence are not even taken into account in the planning process. Thereby, it is not the probability which is important for a disruptive event, but the strength of the impact. In step 8, the strategies and measures developed in the previous two steps are evaluated (see Schwab, Cerutti and von Reibnitz, 2003, pp.56–59).

This approach is followed by other futurists, among them Heinecke and Schwager (1995) with more or less minor changes (see Table 3).

### 5.2 *The eight-step approach of Peter Schwartz*

Peter Schwartz, president of the Global Business Network, is a pioneer in the field of scenario development. Many people first learned about scenarios from his well-known book *The Art of the Long View* (1996). The approach of Peter Schwartz is to look for archetypal plots which have recurred again and again in human history and fit the driving forces to them. For instance, there might be one scenario of 'winners and losers', in which people assume that resources are finite and refuse to share them (see Kleiner, 1999). The scenario process according to Peter Schwartz starts with the critical issue: what impending decision keeps you awake at night? Then the question is which key factors will determine the success or failure of the critical issue. What are some of the driving forces creating change in the wider world? The driving forces are ranked by importance and uncertainty: most important and most uncertain. The scenario logics are selected and the scenario matrix is created. The next step is to flesh out the scenarios by referring to the key factors and the suggestion of plausible events that might create that state have to be done. How does the decision look in each scenario? A SWOT analysis is helpful. The last step is to find out what might usefully serve as lead toward indicators or signposts that are heading towards one or another of these scenarios.

### 5.3 *Scenario approach of Michel Godet and Fabrice Roubelat*

Mainly based on impact matrices, the prospective toolbox developed by Godet and French prospective research and consulting teams since the middle of the 1970s is a scenario-oriented combination of various techniques (see Arcade *et al.*, 1999, p.2). The scenario method was largely developed at the time Godet was in charge of the Department of Futures Studies with the SEMA Metra Consulting Group, from 1974 to 1979. During the 1980s it was improved at the Conservatoire National des Arts et Métiers with the support of EDF, ELF and the Ministry of Defence (see Godet and Roubelat, 1996). In his book *Scenarios in Strategic Management*, Godet (1987) describes the current French enthusiasm for 'La Prospective', a concept which attempts to free itself from some of the negative views associated with conventional forecasting activities by giving his preferred version of futurising that new name (see Coates, 2000, p.5).

In order to build scenarios and strategies there should be simple and rational tools to stimulate imagination, to improve coherence and to facilitate appropriation. For that reason, Godet and Roubelat (1996, p.166) have elaborated a toolbox which classifies problem-solving methods as follows:

- asking the right questions and identifying the key variables: futures workshops and structural analysis with the so-called 'MICMAC' method
- analysing trends and actors' strategies: retrospective studies and 'MACTOR' method
- reducing uncertainties to realisable scenarios: morphological analysis, expert methods (Delphi, cross-impacts analysis)
- identifying and assessing strategic options: multi-criteria analysis and 'MULTIPOL' method.

The process comprises three major stages: construction of the basis, identification of major issues at stake and construction of scenarios (see Arcade *et al.*, 1999, pp.2–3, and Table 3). The authors suggest a logical sequence to implement the scenario process. During this process the authors may or may not use the toolbox for problem solving in long range planning. One criticism is that the method of Godet has a rather strong academic flavour to appeal to managers. Another criticism is that the combination among different factors which might influence a system in the future is too dependant on subjective judgments and therefore haphazard (see Martelli, 2001).

**Table 3** Comparison of various scenario approaches

<i>Author(s)</i>	<i>Definition</i>	<i>Aim/ Purpose</i>	<i>Types/ Categories</i>	<i>Concept</i>
Schwartz (1996)	Scenarios are tools for ordering one's perceptions about alternative future environments in which today's decisions might be played out. In practice, scenarios resemble a set of stories, written or spoken, built around carefully constructed plots. Stories are an old way of organising knowledge. When used as strategic tool, they confront denial by encouraging, in fact requiring the willing suspension of disbelief. Stories can express multiple perspectives on complex events and scenarios give meaning to these events	To highlight large-scale forces that push the future in different directions  It is about making these forces visible, so that if they do happen, the planner will at least recognise them	No types or categories identified	Eight steps: <ul style="list-style-type: none"> <li>• Identification of the focal issues or decisions</li> <li>• Identification of key forces in the local environment</li> <li>• List of the driving forces (social, economic, political, environmental, technological forces): 'What are the macro-environmental and technological forces listed in step 2?'</li> <li>• Ranking of key factors and driving forces by importance and uncertainty</li> <li>• Selection of scenario logics, in effect, the axes along which the eventual scenarios will differ</li> <li>• Fleshing out the scenario – the logics give the skeleton of the scenarios and returning to the key factors and trends listed in step 1 and 3</li> </ul>

**Table 3** Comparison of various scenario approaches (Continued)

<i>Author(s)</i>	<i>Definition</i>	<i>Aim/ Purpose</i>	<i>Types/ Categories</i>	<i>Concept</i>
Von Reibnitz (1988, 1992), Schwab, Cerutti and von Reibnitz (2003)	A scenario approach involves developing future environment situations (scenarios) and describing the path from any given present to these future situations. These scenarios cover the 'edges' of the scenario funnel	Scenarios create alternatives in case of uncertainties and assemble them into highly consistent scenarios  Scenarios are recommended whenever the problem is complex, uncertain and has long-term effects  Corporate identities should be developed and tested in tandem with the development of strategies on the basis of worked out scenarios  Development goals and strategies (master and alternative strategies)  Re-examing existing goals and strategies  Assessing strategic decisions	Scenario approach suggests to: <ul style="list-style-type: none"><li>• include quantitative and qualitative information/ data</li><li>• use explorative scenarios</li><li>• develop three types of scenarios in the scenario building process: trend extrapolation, best-case and worst-case scenario</li></ul>	<ul style="list-style-type: none"><li>• Exploration of the implications</li><li>• Selection of leading indicators and signposts</li></ul> Eight steps: <ul style="list-style-type: none"><li>• Task analysis (goals, strategies)</li><li>• Influence analysis (areas/ factors, system dynamics)</li><li>• Projections</li><li>• Clustering alternatives, consistency analysis</li><li>• Scenario interpretation/ development/ visualisation</li><li>• Consequence analysis (opportunities, risks, actions)</li><li>• Analysis of disruptive events/ wild cards</li><li>• Scenario transfer (developing core strategy, monitoring system)</li></ul>
Heinecke and Schwager (1995)	Scenarios are alternative, plausible and consistent pictures of the future which consist of logically suited premises and the description of development paths of possible futures built on the present situation	Scenarios: <ul style="list-style-type: none"><li>• foster systematic thinking on external influencing factors</li><li>• reveal basic assumptions</li><li>• help to identify strategic gaps, structural changes and disruptive factors</li><li>• lead to a different awareness of problems</li></ul>	Scenario approach suggests to: <ul style="list-style-type: none"><li>• include quantitative and qualitative information/ data</li><li>• link intuitive (deductive) and model-based (inductive) methods/ tools</li><li>• use explorative scenarios (not normative or descriptive ones)</li></ul>	Eight steps similar to von Reibnitz: <ul style="list-style-type: none"><li>• Problem analysis</li><li>• Identification of influence areas/ factors</li><li>• Identifying descriptors, projection</li><li>• Consistency analysis and/ or cross-impact analysis</li><li>• Scenario interpretation</li><li>• Analysis of disruptive factors/ wild cards</li></ul>

**Table 3** Comparison of various scenario approaches (Continued)

<i>Author(s)</i>	<i>Definition</i>	<i>Aim/ Purpose</i>	<i>Types/ Categories</i>	<i>Concept</i>
	They give not a future forecast or prognosis of what will happen but consistent pictures what could possibly happen without evaluating the probability of becoming reality	<ul style="list-style-type: none"> <li>• make decision-makers more sensitive to future potentials</li> <li>• reduce misjudgements</li> <li>• help to formulate and evaluate visions and strategies</li> </ul>	<ul style="list-style-type: none"> <li>• build scenarios for managers at the level of the corporation and SBUs</li> </ul>	<ul style="list-style-type: none"> <li>• Consequence analysis</li> <li>• Elaborating core strategy, scenario transfer</li> <li>• Linking scenario technique with other methods/ tools (e.g. creativity techniques, Delphi, risk analysis, cluster analysis)</li> </ul>
Godet (1987), Godet and Roubelat (1996)	A scenario is a description of a future situation and the course of events which allows one to move forward from the actual to the future situation	<p>Stimulating strategic thought and communication within companies</p> <p>Improving internal flexibility of response to environmental uncertainty and providing better preparation for possible system breakdowns</p>	<p>A distinction is made between possible scenarios (everything that can be imaged), realisable scenarios (all that is possible, taking account of constraints) and desirable scenarios (they are possible but not all necessarily realisable)</p> <p>According to their probability, these scenarios may be termed reference, trend based, contrasted or normative</p> <p>A trend-based scenario whether it is possible or not corresponds to the extrapolation of trends at all points where choices are to be made</p> <p>It is among the realisable scenario, which has a higher than zero probability, that we find contrasted (unlikely) scenarios and the field of development where the most probable scenarios are found</p> <p>As regards desirable scenarios, these are found certain within the possible zone and are not all necessarily realisable</p>	<p>Three major stages:</p> <ul style="list-style-type: none"> <li>• Construction of the basis and identification of essential variables</li> <li>• Identification of major issues at stake and key questions for the future</li> <li>• Elaboration of exploratory scenarios</li> </ul>

## 6 Quality and evaluation of scenario techniques

Only a limited number of scenarios can be developed in detail, otherwise the process dissipates. The core question is how can an approach be developed that will produce a manageable number of scenarios, in a logical manner, that best captures the dynamics of the situation and communicates the core issues effectively. According to Wilson (1998) the golden rule in deciding the number of scenarios is no fewer than two, and no more than four. He suggests five criteria for selecting scenarios:

- *Plausibility*: the selected scenarios have to be capable of happening.
- *Differentiation*: they should be structurally different and not simple variations on the same theme.
- *Consistency*: the combination of logics in a scenario has to ensure that there is no built-in internal inconsistency that would undermine its credibility.
- *Decision-making utility*: each scenario should contribute specific insights into the future that help to make the decision identified in step one.
- *Challenge*: the scenarios should challenge the organisation's conventional wisdom about the future.

According to von Reibnitz (1991, p.28), scenarios should have the greatest possible consistency and compatibility, stability and variability. Heinecke and Schwager (1995) compiled out of a literature review four criteria for scenarios (clarity, thoroughness, relevance, constitution/ relationship) which are summarised in Table 4.

Evaluating the effectiveness of any 'future' activity, among them scenarios, is problematic. A conventional research approach towards measuring the effectiveness of a particular methodology is relatively straightforward. Possible criteria are the following ones (see Bishop, 2001 in Ratcliffe, 2002, pp.16–17):

- Was futures research (*the developed scenarios*) used in making the decision?
- Did the decision makers in each case take all relevant factors and implications into account?
- How confident or satisfied was each group with the decisions they made?
- Did the decisions have their intended effect?
- Were all the consequences anticipated?

Two problems hereby arise. Firstly, actual decisions in future-oriented fields invariably take a long time to make and a very much longer time to have an effect. Secondly, there are not the organisations or individuals around who are properly equipped to undertake such an evaluation. It has been recommended that the best approach towards achieving legitimacy and recognition for future work is not to try to measure the benefits of the field directly, but rather to acknowledge and promote those who are clearly doing it well (see Bishop 2001 in Ratcliffe, 2002, p.17). This concedes that, for the moment at least, futures activity is more art than science, and good futurists rely more upon their skills and

experience than they do upon published methods or techniques learned through any formal education or training. Reputation and proven performance are currently better means of estimating professional value, than any form of official accreditation or certification. What perhaps is needed is some form of establishing and disseminating 'best practice' examples for the various approaches, methods and techniques that have successfully been developed and used in the futures field.

**Table 4** Catalogue of criteria for the quality of scenarios (summarised from Heinecke and Schwager, 1995, p.12)

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*Clarity (scenarios should be understandably formulated for the reader)*

Clearness (avoid misunderstandings)

Cohesion with the object of investigation

Suitability

Transparency

*Thoroughness of the Content*

Flawlessness (no invalid assumptions)

Plausibility

Completeness

Finding of cohesions

Description of development paths

Information content (precision, universality, utility)

*Relevance*

Function of decision

Function of orientation

Relevance in different planning processes (target building, identification and analysis of problems, forecast, assessment and decision)

*Constitution and Relationship of Scenarios among Themselves*

Dissimilarity

Covering all future situations

Homogeneous forms and statements

Stability

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## **7 Discussion: strengths and weaknesses of scenario approaches**

Our review of the literature on scenario techniques shows that scenarios are distinguished from other methods by both system thinking (in contrast to linear thinking) and taking into account multiple futures (in contrast to one future). The oil crisis in the mid 1970s had an effect on futures research as such and pointed out a change in the paradigm of futures research from 'forecasting' towards 'foresight'. Forecasting is understood hereby as a prediction or statement of what is expected to happen in the future, especially in relation to a particular event or situation; the basic assumption is that one future can be

predicted if the forecast activity is performed with the necessary accuracy. In contrast, foresight is regarded as the ability to see what one's future needs are likely to be; the basic assumption is that there is a range of possible futures and a stronger focus on the process perspective of the foresight activities. Scenario techniques fit very much in the latter understanding.

Our – again draft and incomplete – overview of the origin and various selected scenario techniques shows that there is a large number of different understandings and ways of building scenarios. The method as such seems to have reached a mature stage in the 1990s and the differences in the scenario approaches are more or less minor now. However, scenario technique itself has changed due to the change in the futures research paradigm in the 1970s from a more quantitative, modelling perspective towards a more qualitative, process-oriented one.

The use of scenario techniques has several strengths:

- Firstly, it is again important to note that 'foresight' concepts differ from 'forecasting'. In the past, attempts were often made to predict (forecast) the future as accurately as possible. However, different developments in related fields should leave open several possible developments (see Fink *et al.*, 2000). The strength of scenarios is that they do not describe just one future, but that several realisable or desirable futures are placed side by side (multiple futures).
- Secondly, scenarios open up the mind to hitherto unimaginable possibilities and challenge long-held internal beliefs of an organisation; moreover, the use of scenarios can change the corporate culture, compelling its managers to rethink radically the hypotheses on which they have grounded their strategy.
- Thirdly, scenarios are an appropriate way to recognise 'weak signals', technological discontinuities or disruptive events and include them into long-range planning; as a consequence, the organisation is better prepared to handle new situations as they arise and to promote proactive leadership initiatives.
- Fourthly, one function of scenarios beyond the planning aspect is improving communication: scenarios can lead to the creation of a common language for dealing with strategic issues by opening a strategic conversation within an organisation; this aspect is emphasised especially by van der Heijden (1996).
- Fifthly, another function beyond the planning aspect is the coordinating function: during the scenario process the aims, opportunities, risks, and strategies are shared between the participants which supports the coordination and implementation of actions. In fact, the organisational learning and the decision making process is improved.
- Sixthly, the large number of different scenario techniques points out that the ways of building a scenario are very flexible and can be adjusted to the specific task/situation.

In contrast to these mentioned strengths, scenario techniques have several weaknesses:

- The practice of scenario is very time-consuming. Therefore, there could be a wish to condense scenario building to a half-day or one day activity. However, this may not give participants enough time.
- A more qualitative approach has to put a strong emphasis on the selection of suitable participants/ experts, and in practice this could not be an easy task to fulfil.
- Further, it should not be overlooked that a deep understanding and knowledge of the field under investigation is absolutely necessary. Data and information from different sources have to be collected and interpreted which makes scenario building even more time-consuming.
- It could be difficult not to focus on black and white scenarios or the most likely scenario (wishful thinking) during the scenario-building process.

So far, scenario building and planning is a fairly practitioner-driven approach. The literature refers to successful cases and is fairly normative about the strengths and success of scenario techniques. In contrast, there is only a small number of studies which analyse the relationship between scenario planning and firm performance or try to evaluate the accuracy of the outcomes of a scenario. Regarding further research on scenario techniques, firstly, there is clearly a gap to be closed. A starting point for an assessment could be to distinguish between content and process and to develop on that basis a method for evaluation. Secondly, scenario building is often considered as primarily a tool for large multinational corporations. To develop a suitable scenario approach for small and medium-sized enterprises on a scientific ground could also be a favourable task for research in this field. Thirdly, scenario techniques may be improved a lot if they are combined with other future methods (like e.g. roadmapping, Delphi, creativity techniques) and a concise mix of methods could also be evaluated.

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