Scenario Management—An Approach for Strategic Foresight

Alexander Fink and Oliver Schlake

Scenario Management International AG

EXECUTIVE SUMMARY

Scenarios are an effective tool for helping a company to be successful in its competitive environment. The authors show how CI professionals can develop corporate, industry, market, and global scenarios. This is explained by the case study of the German pump industry. The authors also describe the integration of scenarios into the processes of competitive intelligence and strategic management. This includes specific methodological approaches to identify the consequences of certain scenarios, to develop new strategies, and to assess existing strategic guidelines and current strategic decisions. In addition, they show how to combine scenarios and early-warning systems within a process of strategic foresight. © 2000 John Wiley & Sons, Inc.

To guarantee competitiveness, enterprises must identify upcoming opportunities and threats very early and integrate them into strategic planning on time. Therefore, they should not look only for a single visionary view that most likely corresponds with their expectations. Instead, they should try to acquire multiple views that describe a whole "window of opportunities."

Scenarios promise a way to better cope with growing uncertainties. As shown in Figure 1, the concept of Scenario Management is based on three main principles:

- ***Systems Thinking***: *There is ever greater diversity and dynamic in entrepreneurial activity. Many traditional management approaches are based on a separate consideration of individual fields and influencing factors. Therefore, they are doomed to fail. In the course of their planning, not only companies but also organizations and administrations thus need to consider the development and the behavior of complex systems.*
- ***Future-open Thinking***: *It is increasingly difficult to make precise predictions of future trends and developments. Therefore companies and organizations have to unlearn the idea that there exists a single predictable future. Instead they have to include alternative options in their calculations of how influencing factors will develop.*

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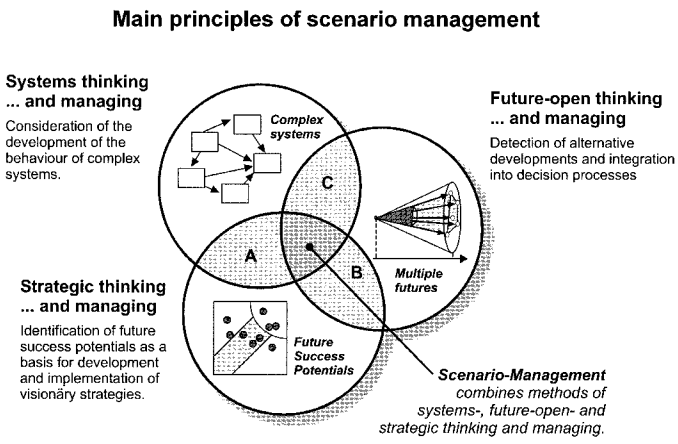

Figure 1.

Main principles of scenario management.

- ***Strategic Thinking:*** *In former times, companies focused only on the control factors liquidity and success. With the first post-war depression and the oil crises in the 1970s, the "Age of Continuity" came to an end. Enterprises could no longer strive for short-term profit maximization only. They also needed to take the creation and preservation of requirements for future success into account. This led to a new strategic control factor called success potential. The sooner enterprises identify success potentials and the better they develop them, the greater their success will be in the future. Strategic thinking is therefore a prerequisite for successful action in a complex and turbulent environment.*

Figure 1 also shows some traditional approaches in this field: System Dynamics is a combination of *systems thinking* and *strategic thinking*—but without the multiple perspective (A). Most deductive approaches of scenario planning are based on *future-open thinking* and *strategic thinking*—but they ignore the complexity in the future sphere (B). Other, more technocratic approaches—mostly from Continental Europe—create very complex scenarios but often fail with the integration into strategic management (C). Scenario Management combines methods of *systems thinking*, *future-open thinking*, and *strategic thinking*.

Phases of a Scenario Project

Relying on the principles of *systems thinking* and *future-open thinking*, we define a scenario as a generally intelligible description of a possible situation in the future, based on a complex network of influence factors. A scenario project supports entrepreneurial decisions by the creation and use of scenarios. As shown in Figure 2, a scenario project typically runs through the following five phases.

Scenario Preparation (Phase 1)

The main goal of a scenario project is to support entrepreneurial decisions. This process always focuses on a particular object, e.g., an enterprise (What core competencies should be built up?), a product (What requirements should be met by a product?), or a technology (What solution approach should be realized?). This focus of a scenario-project is called the *decision field*. It stands in the center of the scenario management process.

Before alternative visionary views in the form of scenarios are developed, the decision field should be assessed in its current situation. Therefore, conventional management tools such as strength-weakness profiles and portfolios can be used. Complex decision fields can be split up into single components. The result of the scenario preparation is called the scenario base, because it is both the starting point of the scenario creation (phases 2 to 4) and the scenario transfer (phase 5).

- ***Pump Industry Example:*** *The German pump industry is dominated by small- and medium-sized enterprises (SME) that reached a leading position on the global markets. Main success factors were product quality and technological leadership. Their position was threatened by new and inexpensive competitors who improved their quality and technological standards. In addition, the global disadvantages of Germany as a high-labor-cost country were a critical success factor, too. In studies, most consultants recommended cost reduction programs and outsourcing of production. To identify alternative strategic options and to work out new research programs, the industrial organization developed market scenarios.*

Scenario Field Analysis (Phase 2)

To support entrepreneurial decisions, scenarios have to be created and precisely adjusted to the decision-making process. In addition to the above-mentioned decision field, a specific *scenario field* is defined. It describes the subject of scenario creation. As shown in Figure 3, the most frequently used scenario fields are:

Corporate Scenarios: The center of the scenario field is the company or a specific business unit. The corporate environment includes four influence areas: the industry (= field of competitors), the markets, substitutes, and complementary products and services. The global environment includes the influence areas policy, economy, society, and technology.

Industry Scenarios: Here the competitive situation within the industry is the center of the scenario field.

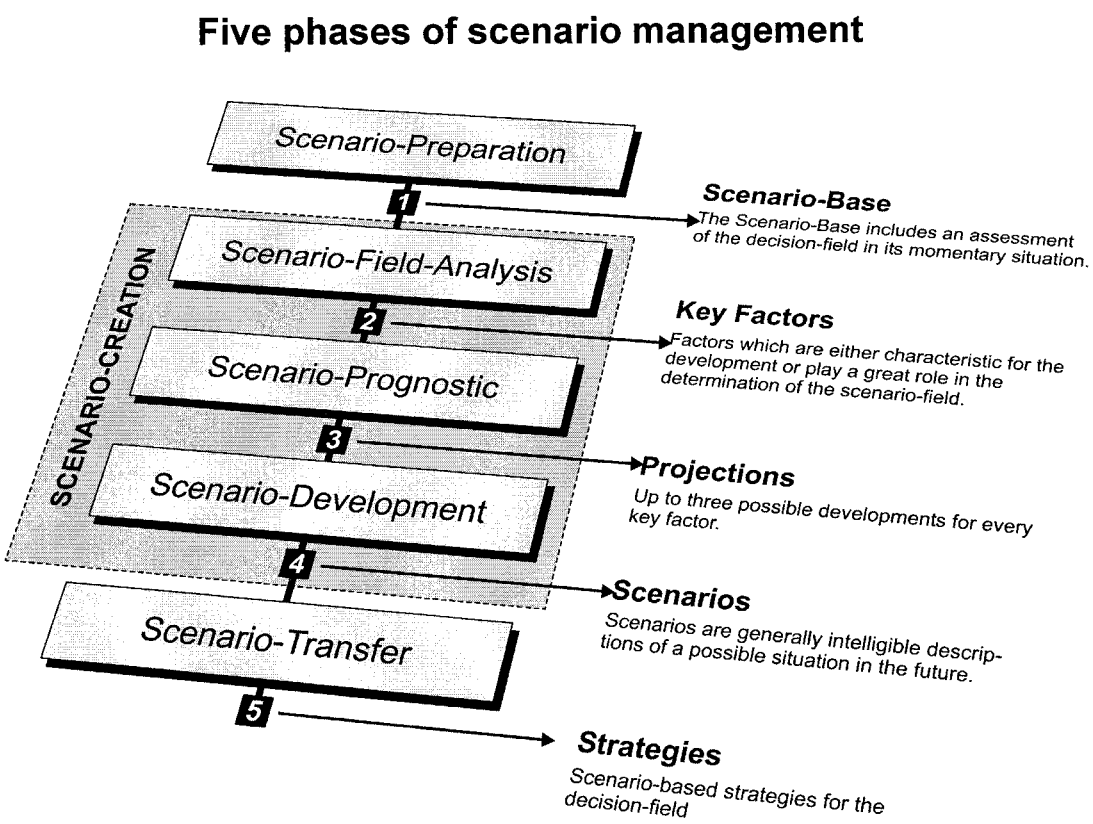

Figure 2.

Five phases of scenario management.

The industrial environment is characterized by suppliers, markets, substitutes, and complementors. The global environment has to be added.

Market Scenarios: The center of these kinds of scenario fields is a specific market. The market environment includes the industry (not only one's own company), final users, substitutes, and complementors. In addition, the global environment has to be taken into account.

Global Scenarios: These scenarios focus on specific global issues, e.g., the future of electronic commerce. Around these issue are a specific "issue environment" and the global environment.

The next three phases can be summarized as scenario creation. As shown in Figure 2, visionary views of the future of the specific scenario field are worked out during these phases. Every scenario field consists of a large number of influence factors. Sometimes up to 150 factors can be identified in a highly creative team process. This process can be supported by specific methods such as brainstorming, brainwriting, or the method 6–3–5. The scenario team should also take a look at the balance of the influence factors within the environmental areas.

Depending on the different decision situations, three general types of scenarios can be created:

- ***External Scenarios:*** *The scenario field can concentrate on non-influenceable, external factors. A small manufacturer who wants to start a joint venture in China can use scenarios to describe possible socioeconomic developments in Eastern Asia that he cannot influence. External scenarios describe possible external conditions.*
- ***Internal Scenarios:*** *The scenario field focuses on internal factors. Internal scenarios are fully influenceable. A government can create scenarios to describe different possible actions and their results. A company can create scenarios to figure out possible product specifications.*
- ***Systems Scenarios:*** *A scenario field can include both internal and external factors. These scenarios are easy to create but different to deal with. They are only influenceable in parts and alternate between actions and side conditions.*

To use the full number of the identified influence factors during scenario creation would lead to scenarios that are too complex and too blurred. Only those factors are

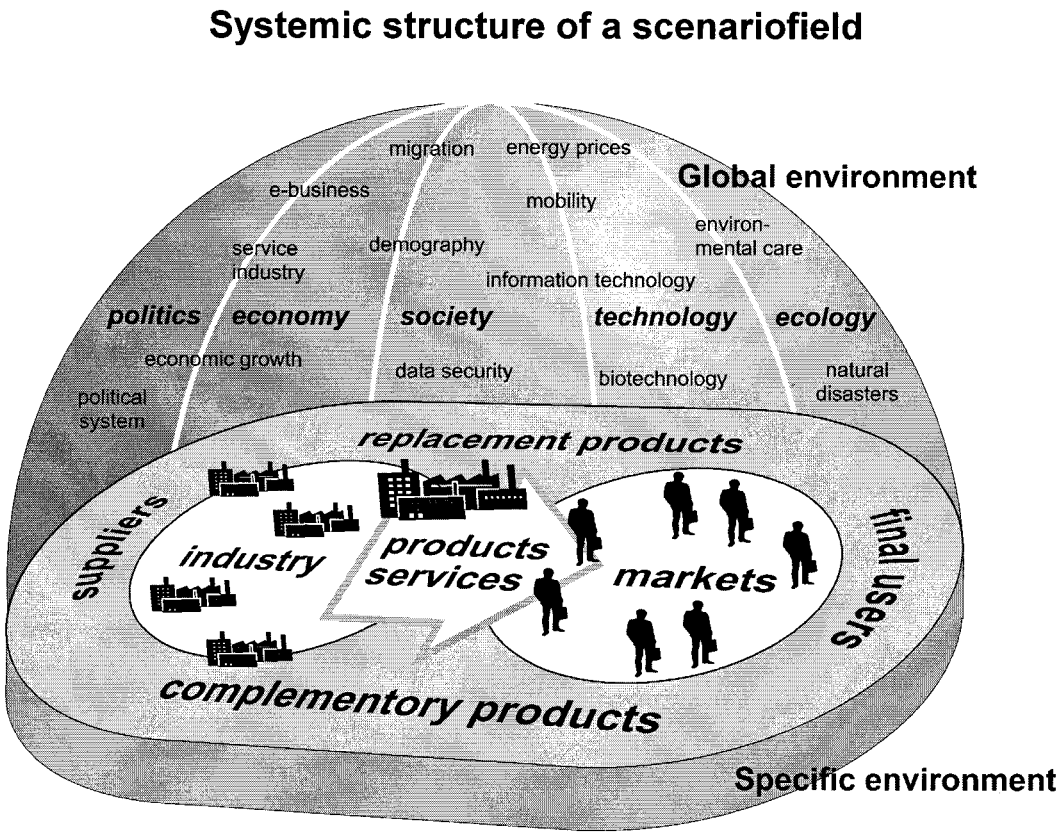

Figure 3.

Systemic structure of a scenario field.

selected that are either characteristic for the development or play a great role in the determination of the scenario field. They are called *key factors*. They can be extracted with the help of an influence analysis (Fig. 4, mid-left). The influences between all internal and external factors are recorded in an influence matrix. The sums of rows (activities) and columns (passivity) give a first idea if a factor is eligible as a key factor. The systemic behavior of the factors can be visualized using system grids. Subsystems, dominant factors, and critical-feedback loops can be identified, too. In addition to this direct influence analysis, a more sophisticated indirect relationship analysis between the factors can also be calculated.

INTERNAL AND EXTERNAL FACTORS CAN BE VISUALIZED USING SYSTEM GRIDS. SUBSYSTEMS, DOMINANT FACTORS, AND CRITICAL FEEDBACK LOOPS CAN BE IDENTIFIED, TOO. IN ADDITION TO DIRECT INFLUENCE ANALYSIS, A MORE SOPHISTICATED INDIRECT RELATIONSHIP ANALYSIS BETWEEN THE FACTORS ALSO CAN BE CALCULATED.

- ***Pump Industry Example:*** *The industrial organization wanted to know how the global pump market and its relevant environment might develop in the future. Therefore they defined all those external factors that may have a direct effect on as their scenario field. During a workshop consisting of executives of leading German pump manufacturers, these factors underwent an influence analysis. The influence analysis led to 20 key factors:*
  - ***Markets:*** *(1) regional development, (2) industrial structure, (3) business climate in Germany, (4) technological environment, (5) time to market product to customer, (6) economies of scale/economies of scope, (7) protection of technological competencies.*
  - ***Customers:*** *(8) customer behavior, (9) relation pump-industry customer, (10) versatility of customer expectations, (11) application range of pumps, (12) size of pumps.*
  - ***Technology:*** *(13) materials, (14) production technologies, (15) coat technologies, (16) external production, (17) standards, (18) diagnosis and information management, (19) communication technologies, (20) R&D-processes and CAD-tools.*

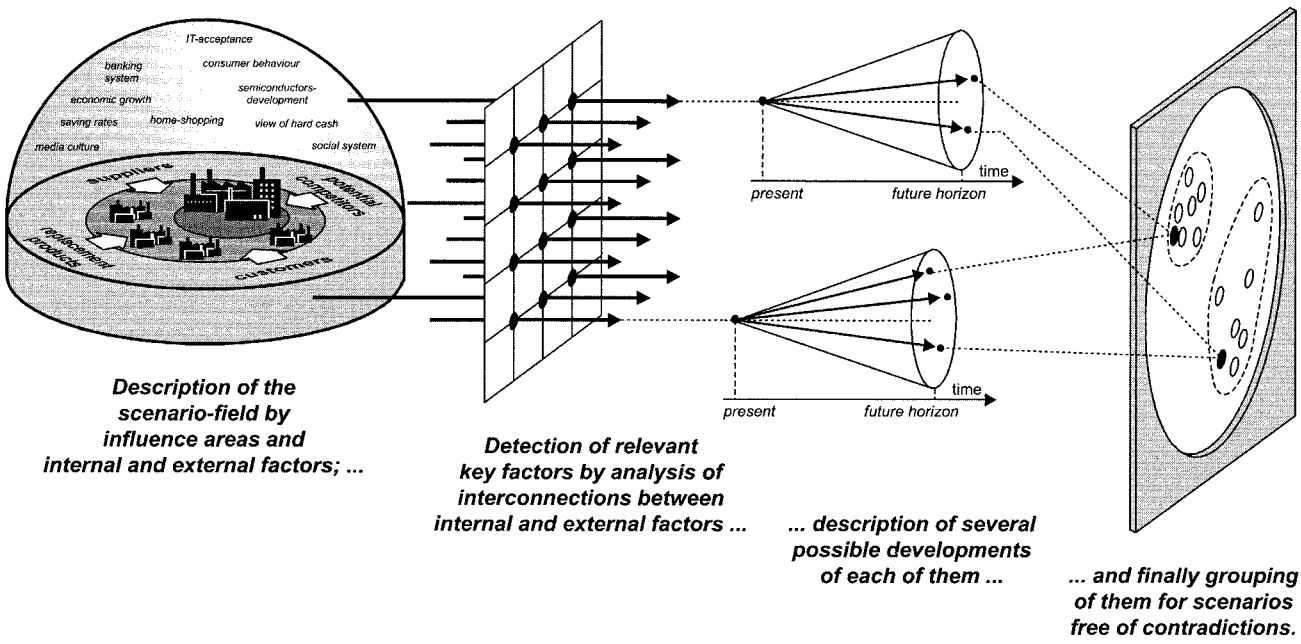

Figure 4.

Process of scenario creation.

Scenario Prognostics (Phase 3)

Phase 3 is the heart of the scenario creation, where the view into the future is carried out (Fig. 4, mid-right). First, a *future horizon* is defined by the scenario team—the time in the future that should be described by the scenarios. After this, the team searches and identifies possible developments for all key factors, so-called *projections*. It is possibly to work out up to four projections per factor. The aim is not to find only one projection that is most likely to take place, but also to find alternative and plausible images that can be used to enable the scenarios to utterly describe the "window of opportunity." The projections for all key factors are listed in a catalog.

- ***Pump Industry Example:*** *The year 2005 was set as the future horizon for the project. Within a workshop alternative projections for most of the key factors were worked out. The factor "industrial structure" is described by means of three alternative projections: (1) domination of small and medium-sized enterprises, (2) concentration process, and (3) alliances and virtual companies.*

Scenario Development (Phase 4)

Scenarios are presentations of possible futures. They rely on plausible and consistent combinations of projections (Fig. 4, right). These projection bundles are simple scenarios that can be constructed based on a *consistency analysis*. All combinations of projections are evaluated in a consistency matrix with respect to their plausibility towards each other. A scenario software program then analyzes the millions of mathematically possible combinations, eliminating those that show total inconsistencies within their projections. This consistency reduces the possible combinations to only "a few thousand" possible and plausible projection bundles.

The next step is named *prescenario creation*. The aim is to figure out a suitable amount of scenarios and to assign the projection bundles to the determined scenarios. Therefore, we use cluster analysis. At the starting point of the cluster analysis all projection bundles are understood as separate clusters (finest partition). In the first step, the two projection bundles with the greatest similarity are put together in one new cluster. This cluster process could theoretically go on until all projection bundles are put together in one cluster (coarsest partition). But every clustering is bound with a loss of information. This information loss is used to figure out the suitable partition that is the best combination of less clusters (less scenarios) and less information loss.

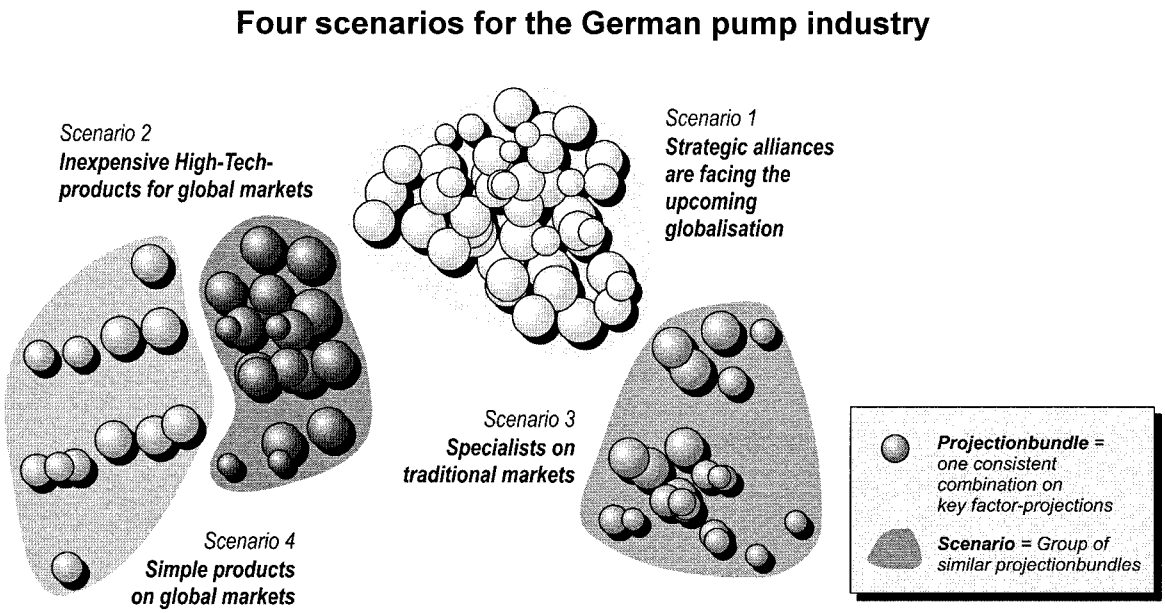

Figure 5.

Four scenarios for the German pump industry.

The amount of scenarios depends on the differentness of the projection bundles and the complexity of the future situation, and not on the habits of the scenario team. That is why these scenarios build on the ideas of clients more effectively than the intuitive–logic approaches. As shown in Figure 5, the aid of multidimensional scaling (MDS) allows the projection bundles and scenarios to be visualized in a future space. We call this step "future-mapping."

The final step in creating a scenario is the *scenario description*. The prescenarios must be analyzed separately. Projections that appear in the majority of projection bundles of a certain prescenario are used in the prosaic description of this scenario. The scenario description can be completed by identifying disruptive factors or events, robustness, and sensitivity analyses.

- ***Pump Industry Example:*** *As a result of scenario development, four market scenarios described alternative positions of the pump industry in the year 2005 (Fig. 5):*
  - ***Strategic alliances are facing the upcoming globalization.*** *Scenario I describes a development with a SME-dominated industry based on high-tech products. The most important success factor is strategic alliances between the small- and medium-sized enterprises.*
  - ***Inexpensive high-tech products for global markets.*** *Scenario II describes a development in which German SME's have to cope with an increase of competition intensity in the industry. The growing importance of unit costs lead to a concentration movement within the industry.*
  - ***Specialists on traditional markets.*** *Scenario III describes an industrial development characterized by a strong fragmentation of the markets. Small and medium-size enterprises have to focus on certain niches.*
  - ***Simple products on global markets.*** *Scenario IV is the worst-case scenario for the German SME's because it describes an industry dominated by a few global players with several factories all over the world. Customers tend to look for inexpensive standard products.*

Scenario Transfer (Phase 5)

The use of scenarios in strategic management begins with an analysis of the effects they have on the business (or general: the decision field). Using this consequence, analysis is "rehearsing the future. You run through the simulated events as if you were already living them. You train yourself to recognize which drama is unfolding. That helps you avoid unpleasant surprises, and know how to act." (Schwartz, 1991) With the aid of a matrix, the consequences of the found scenarios for the decision field are systematically analyzed.

After the identification of opportunities and threats, companies have to develop strategies. Corporate or business strategies can be carried out in one of three

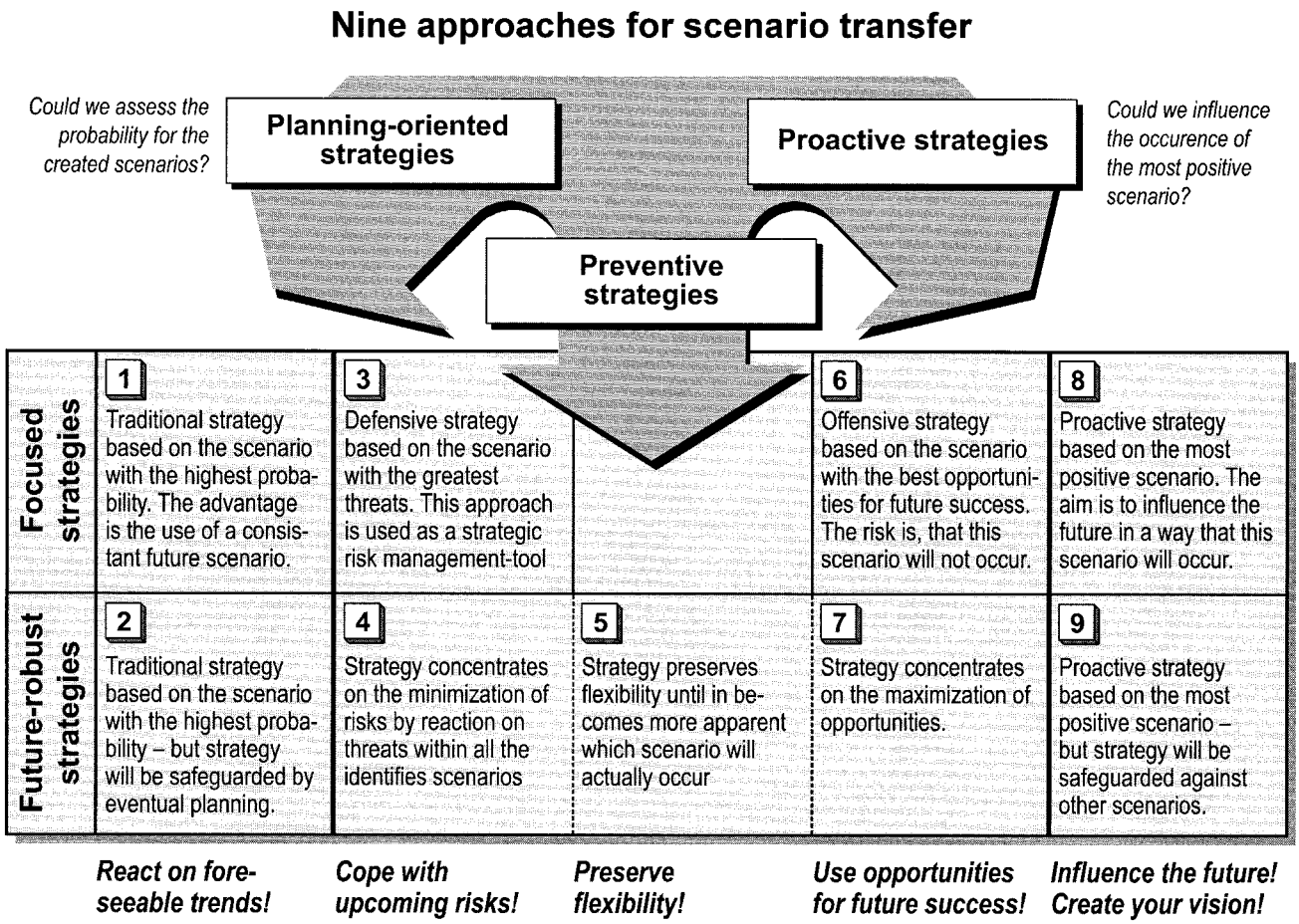

Figure 6.

Nine approaches for scenario transfer.

ways, depending on the specific planning situation and the corporate culture of the company:

1. Planning-Oriented Strategy: *This approach is "based on the belief that some environmental changes can be predicted. On that assumption, strategists do not have to wait and react but can make specific decisions and take specific actions in anticipation of forthcoming changes" (Makriadakis, 1990, p. 170).*

2. Preventive Strategy: *Here the emphasis is on reacting to environmental changes. Uncertainty is accepted, and the aim is to cope with unforeseen change.*

3. Proactive Strategy: *The strategists accept that "a wide range of environmental changes are unpredictable, but attempt nevertheless to anticipate events and to do things ahead of time to exploit their arrival. That is done by shaping the environment in some desired direction so that unwanted changes will be less likely to occur. . . or purposeful action can be taken by the organization to bring about desired change that would not have occurred otherwise or would have happened later" (Makridakis, 1990, pp. 170–171).*

In scenario management, companies can base their planning on one reference scenario (*focused planning*) or try to base their planning on different scenarios (*future robust planning*). Focused strategies are powerful strategies that are easy to communicate. Future robust strategies are flexible strategies that are open for alternative developments. As shown in Figure 6, there are nine main approaches for scenario-based planning:

1. ***React on foreseeable trends.*** *Here a focused (1) or safeguarded (2) strategy is based on the scenario with the greatest probability: This conventional one-dimensional strategy is easy to communicate because there are less inhibitions to overcome. But in an uncertain world, traditional prognoses and most-probable projections come true less often than planners think*
2. ***Cope with upcoming risks.*** *Here a focused strategy is based on the scenario with the greatest threats (3) or a future-robust strategy concentrates on the minimization of threats (4). This is an effective approach to cope with*

upcoming threats (e.g., in risk management), but these strategies are only an "add-on" for strategy development.

3. ***Preserve flexibility.*** *Here a future robust strategy concentrates on the increase of flexibility (5). This is an effective strategy to handle uncertainties. But this kind of strategy is often not powerful enough because resources are split and the strategy is difficult to communicate.*
4. ***Use opportunities for future success.*** *Here a focused strategy is based on the scenario with the greatest opportunities (6) or a future-robust strategy tries to cope with all upcoming opportunities (7). On the one hand, this is a very powerful strategy to foresee future potentials very early and achieve the best-possible results. On the other hand, this strategy includes very high threats because other possible developments are simply ignored.*
5. ***Influence the future—create your vision.*** *Here a focused (8) or safeguarded (9) strategy is based on the desirable future: This is a proactive strategy in which the enterprise tries to create their own future by using a best-case scenario as an objective in strategic planning. This strategy can be safeguarded by putting the strategy in different environments (drawing from previously developed external scenarios).*

⬭ ***Pump Industry Example:*** *The goal of this project was not to develop concrete products but to find a strategic guideline for the whole industry. In this case the analysis of the scenarios led directly to alternative strategic options in which the option of more alliances was the most attractive for the small- and medium-sized enterprises. This option was based on the market scenarios I, II, and III but with a strong focus on scenario I. It was the starting point for the development of a mission statement, core competencies of the industry, and last—but not least—specific research programs of certain companies and alliances.*

From Selective Use to Strategic Foresight

Most companies and organizations start with workshops or future conferences and run more complex scenario projects afterwards. With the integration of different people into the process of scenario planning, they recognize that scenarios have different functions within strategic management:

1. ***Decision support.*** *Scenarios are used to support entrepreneurial decisions. To meet the demands of strategic management, scenario-planning activities should focus on phase 5, scenario transfer.*
2. ***Creation of "orientation-knowledge."*** *Creating scenarios generates knowledge for the company about its future development prospects. This knowledge does not have to be translated into decisions immediately, but is always available to decision-makers when real decision situations arise. Scenario planning is thus a way of stockpiling for the future.*
3. ***Communication of future developments.*** *By creating scenarios, easily communicated information about future development prospects is structured and processed. Potential recipients of such information are sales managers, project managers in development, and managerial staff.*
4. ***Stimulation of strategic thinking.*** *Creating scenarios encourages the staff involved in a scenario project to systematically consider future development options. Scenarios act as a catalyst for strategic forward-thinking.*

To support all four functions we have developed a reference model for the use of scenario management as an integrated model of corporate foresight. This model includes three key phases (Fig. 7):

1. ***Strategic early warning.*** *This key phase includes scanning for "weak signals," systematic monitoring processes, and forecasting. The linkage to scenario management is realized on three levels: (1) the use of early-warning information in scenario creation, (2) the stimulation of activities in new field of interest (issue management), and (3) the return of scenarios and elements of the scenario creation process into the early-warning system.*
2. ***Integrated scenario creation.*** *The second key phase is based on a decentralized scenario-creation process on the corporate, business, and functional level. It is one of the most important advantages of scenario management that this approach can be used both in large and integrated corporate planning processes and in small workshops. These decentralized activities could be supported by the creation of central scenarios or scenario elements—for example, the creation of global scenarios by the corporate planning unit.*
3. ***Scenario aided strategy process.*** *The last key phase pertains to the use of scenarios to improve the traditional strategy process, and includes methods for the scenario-supported development of mission statements, of corporate competencies, and strategic business areas.*

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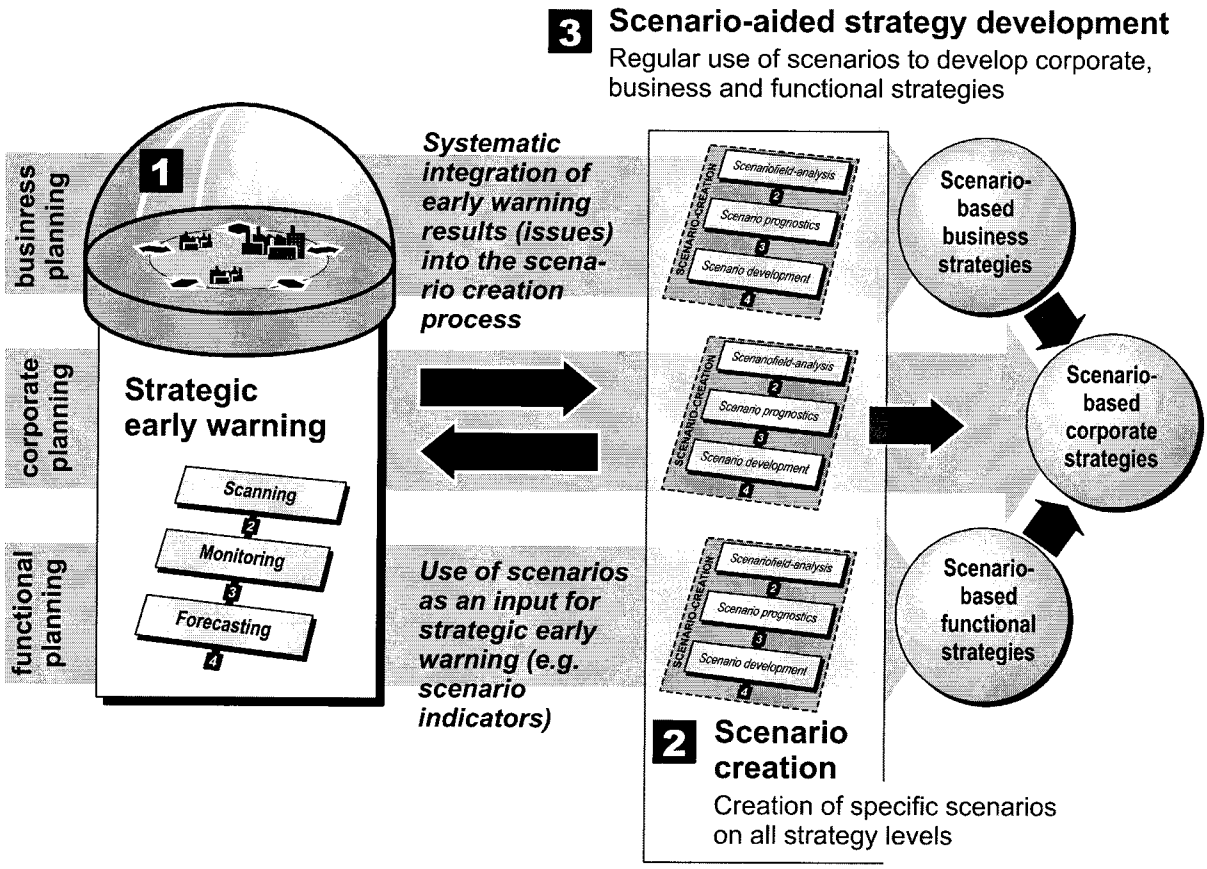

Figure 7.

Elements of strategic foresight.

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About the Authors

Alexander Fink and Oliver Schlake are co-founders and members of the executive board of Scenario Management International (ScMI AG), a Paderborn/Germany-based company for future research and strategic management. They are co-authors of Scenario Management—Planning and Leading with Scenarios and Management in Flux *(in German only). They can be contacted by e-mail: fink@scmi.de or schlake@scmi.de. For further information, please consult the website: www.scmi.de.*