Five Views of the Future™
A Strategic Analysis Framework

Overview and Methods

A white paper by Technology Futures, Inc.

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Five Views of the Future™

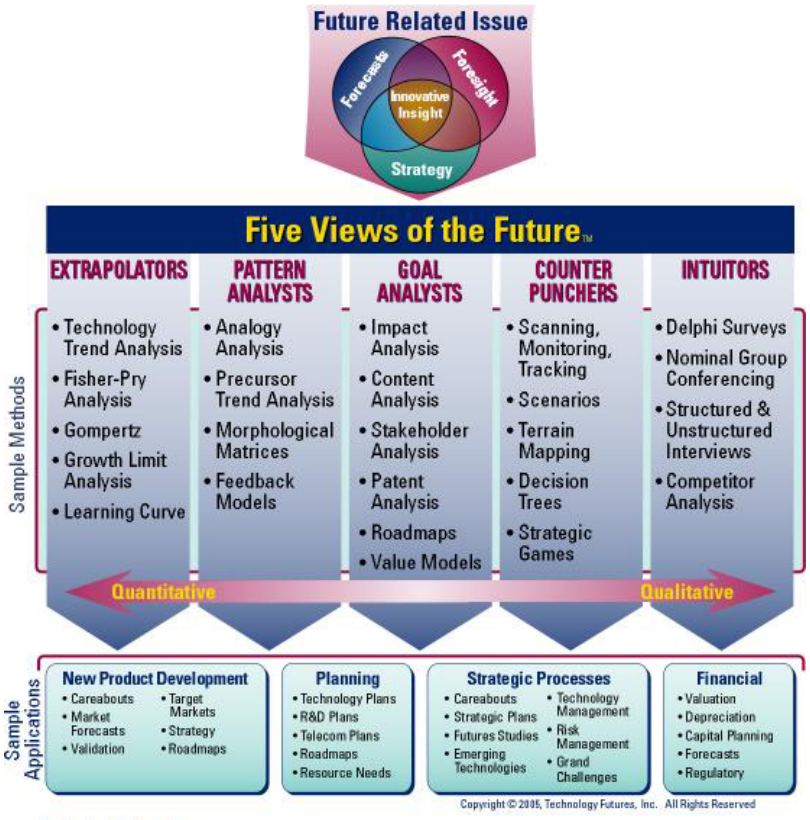
A Strategic Analysis Framework

Overview and Methods

Technology Futures, Inc. has developed a strategic analysis framework, Five Views of the Future™, that allows us to take maximum advantage of a large variety of proven methods when conducting technology/market forecasts. The framework is based on the five ways people view the future as extrapolators, pattern analysts, goal analysts, counter punchers, or intuitors. The descriptions below explain the rationale on which each view is based, list several methods that are associated with that view, and indicate whether typical results from each of the methods are quantitative or qualitative in nature.

Each way of looking at the future has its advantages and shortcomings. However, our experience has been that, typically, more valid forecasts result from using a variety of methods from different views rather than any one. Thus, in our technology/market forecasting projects, TFI normally uses methods from at least two different views. These five views, as illustrated in the following chart, individually and in concert, provide the foundation for a powerful forecasting program.

Five Views of the Future™, A Strategic Analysis Framework



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Extrapolators

Extrapolators believe that the future will represent a logical extension of the past. Large-scale, inexorable forces will drive the future in a continuous, reasonably predictable manner, and one can, therefore, best forecast the future by identifying past trends and extrapolating them in a reasoned, logical manner. Methods associated with this view include:

Technology Trend Analysis is based on the observation that advances in technologies tend to follow an exponential improvement process. The technique uses early improvement data to establish the rate of progress and extrapolates that rate to project the level of progress at various times in the future. Results produced by this technique are typically highly quantitative. In practice, this technique is typically used to forecast developments such as the speed of operation, level of performance, cost reduction, improved quality, and operating efficiency.

Fisher-Pry Analysis is a mathematical technique used to project the rate of market adoption of technically superior new technologies and, when appropriate, to project the loss of market share by old technologies. The technique is based on the fact that the adoption of such new technologies normally follows a pattern known to mathematicians as the "Logistic Curve." This adoption pattern is defined by two parameters. One of these parameters determines the time at which adoption begins, and the other determines the rate at which adoption will occur. These parameters can be determined from early adoption data, and the resulting pattern can be used to project the time at which market takeover will reach any given level. Results produced by this technique are highly quantitative. The technique is used to make such forecasts as how the installed base of telecommunications equipment will change over time, how rapidly a new chemical production process will be adopted, and the rate at which digital measuring devices will replace analog devices in petroleum refineries.

Gompertz Analysis is very similar in concept to Fisher-Pry Analysis. It is a better model for adoptions that are driven by the technical superiority of the new technology, but where customers do not suffer any significant penalty for not adopting the new technology at any given time. Like Fisher-Pry analysis, Gompertz analysis projects adoption by use of a two parameter mathematical model. In similar manner, early adoption is used to determine the parameters and the resulting adoption curve. Results are highly quantitative, and the technique is often used to project adoption of consumer products such as high-definition television, camcorders, and new automobile features.

Growth Limit Analysis utilizes a mathematical formulation known as the Pearl Curve to project the pattern in which maturing technologies will approach development limits. This can often be useful to organizations for analyzing maturing technologies, setting feasible research goals, and determining the utility of additional development spending. The technique can also be useful in determining if new technical approaches can be used to overcome apparent technical limits.

Learning Curve techniques are based on the fact that, as more and more items of a given type are produced, the price of production tends to decrease at a predictable rate. For example, each doubling of the total number of a particular item produced might result in a cost reduction of 15%. In some cases, key technical parameters may improve in a similar pattern. The learning curve phenomenon is reflected as a straight line on log-log graph paper, which makes projection relatively simple. Results from the use of this technique are highly quantitative. The technique

can be used for setting price and technical performance targets for developing technologies, particularly in the middle stages of their development.

Pattern Analysts

Pattern analysts believe that the future will reflect a replication of past events. Powerful feedback mechanisms in our society, together with basic human drives, will cause future trends and events to occur in identifiable cycles and predictable patterns. Thus, one can best address the future by identifying and analyzing analogous situations from the past and relating them to probable futures. Methods associated with this view include:

Analogy Analysis is based on the observation that the patterns of technical development and market capture for new technologies are often similar to those for like technologies in the past. In applying this technique, forecasters identify appropriate analogies and analyze similarities and differences. Normally, it is desirable to identify more than one applicable example in order to minimize the probability of selecting false or inappropriate analogies. The results from application of this technique are typically semi-quantitative in nature, and they are often presented as a range of possibilities rather than a single projection.

Precursor Trend Analysis takes advantage of the fact that, often, the development of one technology lags the development of a related one by a constant period. For example, the first application of technical advances in passenger cars typically occurs approximately four years after their application in racecars. Similarly, the application of new technologies in commercial products tends to follow laboratory demonstration by a relatively constant period. One can, thus, project the status of the lag technology at some future date by observing the status of the lead technology today. This technique also allows the extension of lag technology forecasts by building on forecasts of lead technologies. Results from using this technique are highly quantitative.

Morphological Matrices provide a formal method for uncovering new product and process possibilities. In applying this technique, users first determine the essential functions of the product or process. Next, the different means by which each of these functions could be satisfied are listed. Finally, the matrix can be used to identify new, reasonable combinations of these means that could result in practical new products or processes. Results of the application of this technique are qualitative in nature. The technique can be used to identify non-obvious, new opportunities for a company. This technique can also be used to identify products and processes that competitors might be developing or considering.

Feedback Models provide a means for tracking the interactions that will connect technical, economic, market, societal, and economic factors as the future unfolds. In using this technique, computer models are developed that mathematically specify the relationships between each of the relevant factors. For example, advances in technology may result in improved products that may result in increased sales that may provide more funds for further advances in technology. The results of this technique are highly quantitative, but are often used to examine qualitative consequences of trends, events, or decisions. The technique is most commonly used in the formulation of high-level strategies or policy.

Goal Analysts

Goal analysts believe that the future will be determined by the beliefs and actions of various individuals, organizations, and institutions. The future, therefo re, is susceptible to modification and change by these entities. Thus, the future can best be projected by examining the stated and implied goals of various decision makers and trendsetters, by evaluating the extent to which each can affect future trends and events, and by evaluating what the long-term results of their actions will be. Methods associated with this view include:

Impact Analysis provides a simple, formal method for taking into account the fact that, in a complex society such as ours, trends, events, and decisions often have consequences that are neither intended nor foreseen. The technique combines the use of left-brain and right-brain thinking to project the secondary, tertiary, and higher-order impacts and implications of such occurrences. Results are qualitative in nature. The technique is often used to analyze potential consequences of projected technical advances or to determine areas in which forecasting efforts could best be directed.

Content Analysis is founded on the concept that the relative importance of social, political, commercial, and economic issues are reflected by the amount of media attention the issue receives. Thus, by measuring changes in such factors as column-inches in newspapers, time allocated on television, and, more recently, numbers of items on the Internet, forecasters can project the direction, nature, and rate of change. In the technical arena, this technique can, to some degree, be used to project advances in new technologies, as well as growing market attraction. The results are often displayed in a quantitative format. However, they are typically used only for qualitative analysis.

Stakeholder Analysis is a formal method for measuring the influence that various individuals and institutions can have on the way the future develops.

- It explicitly identifies those people and organizations, internal and external, that have a “stake” in particular decisions, projects, or programs.
- It analyzes the importance that each individual or group assigns to these issues and the relative influence they may have on developments.

The results from this technique are normally semi-quantitative. It is often used to test the validity of forecasts that might be impacted by unexpected opposition or support.

Patent Analysis is based on the presumption that increased interest in new technologies, together with conviction of their practicality and appeal, will be reflected in increased R&D activity which, in turn, will be reflected by increased patent activity. Thus, it is presumed that one can both identify new technology opportunities and assess the state of development of given technologies by analyzing the pattern of patent application in appropriate fields. Results are often presented in quantified terms; however, their use in decision-making is normally based on a qualitative evaluation.

Counter Punchers

Counter punchers believe that the future will result from a series of events and actions that are essentially unpredictable and, to a large extent, random. Therefore, one can best deal with the future by identifying a wide range of possible trends and events, by carefully monitoring developments in the technical and social environments, and by maintaining a high degree of flexibility in the planning process. Methods associated with this view include:

Scanning, Monitoring, and *Tracking* techniques are founded on the observation that, for most new technologies, a finite—often considerable—amount of time is required to traverse the steps between ideation and commercialization. Thus, if one is alert, changes in technology, market, and other business factors can be discerned in time to take advantage of them. All three techniques are employed to identify and evaluate developments that might materially impact the organization's operations and strategies. Although the three techniques are similar in many respects, they differ in purpose, methodology, and degree of focus. *Scanning* seeks to identify any trend or event that might impact the organization and is, therefore, by design, essentially unfocused. *Monitoring* is designed to follow general trends in specified areas and is, thus, more focused than scanning. *Tracking* is designed to carefully follow developments in a limited area and is, consequently, highly focused. Results from each of these techniques can vary between highly quantitative to basically qualitative. However, in general terms, results are less quantitative in scanning activities and more quantitative in tracking activities.

The *Alternate Scenarios* technique provides a structured method for integrating a number of individual forecasts into a series of comprehensive, feasible narratives about how the future might develop. It provides a vehicle for combining many forecasts in a format that allows decision makers to effectively relate the implications of the combination of all forecasts. The results from this technique can range from highly quantitative to purely qualitative, depending on the objectives of the effort, its organization, and purposes to which it will be put. This technique is typically used to assist executives in critical decision-making. Although a single scenario can be used for making decisions, the use of a series of alternate scenarios allows executives to take into account the fact that the future can never be projected with certainty. It also enables determination of how appropriate flexibility can be built into plans.

Monte Carlo Models are computer models that take explicit account of the fact that all projections of future trends and events are, fundamentally, probabilistic in nature. In this technique, all of the steps involved in the development of a new technology are identified, and their interrelationships specified in a mathematical model. Numerical values are assigned to the probability of each event occurring in various ways and to the length of time it will take each event to occur. The model is then run numerous times to determine the probability of various overall outcomes. The results of the technique are highly quantitative, and the technique can be used to project technology development times and patterns, to allocate resources, and to track the development of emerging technologies.

Intuitors

Intuitors are convinced that the future will be shaped by a complex mixture of inexorable trends, random events, and actions of key individuals and institutions. Because of this complexity, there

is no rational technique that can be used to forecast the future. Thus, the best method for projecting future trends and events is to gather as much information as possible and then to depend on subconscious information processing and personal intuition to provide useful insights. Methods associated with this view include:

The *Delphi Survey* technique is a method for taking advantage of the talent, experience, and knowledge of a number of experts in a structured manner that allows an exchange of divergent views without direct confrontation. The technique involves initial projections, usually in quantitative terms, of future events. After the initial projections are correlated, participants are asked to explain, anonymously, their differences in a series of follow-up rounds. Results are normally semi-quantitative. The technique can be used to:

- Project future technical, market, and other developments.
- Uncover fundamental differences of opinion.
- Identify non-conventional ideas and concepts.

Nominal Group Conferencing is a formal technique for structuring the input from a number of subject matter experts. The technique is similar in some ways to "brainstorming," but its structure requires all participants to take active part in the process. It also requires participants to use their brains in different ways:

- Individually generate new ideas.
- Silently assess the ideas of others.
- Jointly examine the implications of new ideas with others.
- Formally evaluate a series of options.

The results of employing this technique are typically semi-quantitative. Nominal Group Conferencing is often used to project future developments, uncover new business opportunities, or identify new solutions to old problems.

Structured and *Unstructured Interviews* are methods for gathering and correlating the thoughts and opinions of a collection of experts about how the future will unfold. *Structured Interviews* are similar to traditional opinion polls in that the people conducting the interviews know ahead of time the information they are seeking, and the interview is organized to get this information as efficiently as possible. The use of personal interviews rather than written surveys promotes participation, decreases the probability of misinterpretation, and assists in assessing the qualification of participants. Results are typically quantitative in nature and can be used to project such items as potential market size, rate of technical advance, and general business factors. *Unstructured Interviews*, on the other hand, are used when the subject area to be addressed is less well defined. The interviewer begins each session with only a limited concept of how the interview will be structured. In large measure, each question is based on the answer to the previous question. The interview is essentially free form, and the results can be either qualitative or semi-quantitative. This technique is particularly valuable in identifying key issues, clarifying general concepts, identifying additional experts, and formulating future structured interviews and surveys.

If you believe the Five Views of the Future™ Strategic Analysis Framework would help your organization in identifying and evaluating new technological opportunities and developing strategies for bringing these technologies to the marketplace, please contact TFI at (800) TEK-FUTR, (512) 258-8898, or info@tfi.com.