

Futures Studies Methods

Introduction

This paper discusses various methods used in futures studies and foresight exercises. It aims to provide background knowledge to other techniques available, which will in turn aid the quality assessment futures/foresight work. It is important to note that in practice, many methods are used in a particular exercise to minimise biases.

Overview of Methods

Futures studies are a multi-disciplinary field, and are concerned with a wide range of views about possible, probably and preferable futures. McHale and McHale (1975) in their international survey of futurists identified more than 17 methodological approaches, often used in conjunction with each other. These include extrapolation techniques using times series data, models, brainstorming, scenarios writing, simulation, historical analogy, Delphi techniques, cross-impact analysis, causal modeling, relevance trees, gaming and contextual mapping.

In terms of national foresight exercises, 6 common methods are identified: projection, relevance tree, morphology, critical technologies, Delphi, and Scenario (Nagel and Wellington, 2000).

There are various ways to categorise methods of futures studies. For example: views of future (pattern analysts, intuitors etc.), time horizon (short term vs. long term outlook), qualitative vs. quantitative, extrapolative vs. normative etc. For the purpose of this paper selected methods are listed in the order of most commonly used ones to least commonly used ones for the statements in the Informan framework. They are as follows:

Most commonly used methods in Informan

- Panel of Experts
- Pattern Analysis And Projection
- Delphi Surveys

Other methods in Informan

- Consultation
- Scenarios Writing
- Goals Analysis
- Pattern Analysis
- Backcasting

Other important futures methods outside Informan

- Modelling
- Simulations and Games
- Brainstorming

- Relevance Tree
- Critical Technologies
- Cross-Impact Analysis
- Morphology Analysis
- Content Analysis
- Patent Analysis
- Visualisation
- Science Fiction

Descriptions of Selected Methods

Most Commonly Used Methods In Informan

- **Panel of Experts**

Future views are based on judgements from a representative group of experts, considering information that they believe will influence subject of interest and combine their conclusions into futures knowledge. No formal model is used and no two experts are likely to consider the same information in the same way, but it has provided good futures insights in many situations. Empirical evidence and theoretical arguments suggest that between 5-20 experts should be used (Makridakis and Wheelwright, 1989). However, in situations involving exponential growth, judgemental forecasts may be inappropriate.

- **Delphi Surveys**

The Delphi method can be thought of simply as a structured brainstorming technique, and is frequently used in national Foresight exercises and consists of interrogations of experts by means of successive iterations of a given questionnaire. Each iteration constitutes a 'round' and is the medium for the experts to state their views. The outcome of each round of opinion gathering is then analysed in a qualitative and quantitative manner, and significant dissenters from the developing consensus are required to explain their continuing reasons for dissent. The number of rounds required in any given studies depends on the level of consensus that the survey aims to achieve. The prime assumption of the conventional Delphi technique is that consensus among a group of respondents is likely to be a better guide than anyone individual opinion. However, on the basis of the above it is crucial that the experts are in a position to express reasoned and well-founded views on issues as far reaching as the intended time horizon. In practice, the main advantage of the method is the networking aspect of experts. Disadvantages include resource-intensiveness and sensitivity to the choice of experts and questions used.

- **Projection**

The objective is to discover a pattern in the historical data and then extrapolate the pattern into the future: the forecast is based solely on the past values of the variable and/or on past forecast errors. Common examples of projection include:

- Time series extrapolation e.g. demographics
- Technology trend analysis, which 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.

In general, projection should be used when:

- 1) Past information about the variable of concern is available
- 2) The information can be quantified
- 3) Reasonable assumption can be made that the pattern if the past will continue into the future

Other Methods In Informan

- **Consultation**

The consultation approach typically involves a series of one-on-one interviews. The Internet is opening up new possibilities for on-line, enabling increased levels of participation via remote access. This enables groups to achieve consensus faster. The advantages are:

- Very flexible and good for “getting a feel” of an issue
- Can involve many people, making it attractive for dissemination of Foresight outputs
- Quick to set up, this leading to fast results

However, the lack of embedded structure in the approach may make the results harder to interpret. Furthermore, the interviews may be time consuming.

- **Goals Analysis**

It provides a framework to take into account the motivations of the various stakeholders within their environment. It involves the following steps

- 1) Identify those people and organizations that have a stake in particular decisions, projects and programs
- 2) Analyse the importance that each individual or group assign to key issues
- 3) Analyse the relative influence that they may have in developments
- 4) Develop tactics/action plans in the light of above analysis

The technique is particularly appropriate in situations where there are key players within an industry or field of investigation who can shape to some extent the environment in which they operate

The fact that the technique is most often used to test the validity of forecasts that might be impacted by unexpected opposition or support, strongly back-up the argument made above.

- **Scenarios Writing**

This method consists of organising information and future possibilities into alternative visions of the future. It is especially useful to aid the comprehension of events that seem to contain a mixture of unrelated information. Scenario methods can be extrapolative or normative depending on the starting point. A normative study will start by determining future goals and objectives, then or backwards to see if and how they can be achieved. An extrapolative study will be based on the assumption that existing trends in the relevant variables will continue. The scenarios themselves must be internally consistent pictures of future possibilities and will be composed of a mixture of quantifiable and non-quantifiable components arranged as alternative logical strings of events. A cross-impact analysis should be performed first to pick out the inter-relations between the assumptions in order to ensure consistency within each scenario. The number of scenarios is normally limited to 2 or 3. The main advantage of this method is to incorporate uncertainties into perspectives and makes explicit that there are many

possible futures. The key limitation is that the scenarios are heavily dependent on the writers.

- **Backcasting**

A futures method in which a particular future scenario is identified in some detail. Its origins and lines of development are then carefully traced back into the present. Often contrasted with forecasting (Slaughter, 1996).

Other Interesting Methods Outside Informan

- **Modelling**

There are many types of models that can be built and used such as:

- *Econometric models*: this involves systems of linear multiple regression equations, each including several interdependent variables.
- *Feedback models*: Provide a means for accounting for 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 relationship 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 advance 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.

- **Simulations And Games**

An attempt to take certain variables from “reality” in some area and create a computer model or game situation in which one can see how those variables might interact with each other over time. Computers or humans (as role players) or both can be involved. With computers, human can play “what if” games, where by making certain choices, they can then see the consequences (in terms of policy) that follow from those choices

- **Brainstorming**

A method of eliciting ideas without judgment or filtering. Often used in the early stages of futures workshops and in many other contexts. Involves encouraging wild and unconstrained suggestions and listing ideas as they emerge. (Slaughter, 1996).

- **Relevance Tree**

A way to map out the sequence of events, and in what order, that are necessary to get from where you are now to where you want to be as your end goal by some future date.

- **Critical Technologies**

Focused discussion by experts on new technologies, and prioritizing their importance to facilitate further discussion on their effects and what should be done at present to help with their developments.

- **Cross-Impact Analysis**

Cross-Impact matrices were developed in: “...recognition of the fact that forecasts of future events, when made in isolation from each other, fail to take their mutual effects into systematic consideration and thus lack a degree of refinement whose

addition, it was felt, might well increase their reliability” (Helmer, 1983). The technique is therefore used by Counter Punchers as a means of analyzing the future in the light of other possible futures. Cross impact analysis is a highly quantitative technique. It is used for the investigation of possible future events and their mutual impact on each other. The time horizon for the technique is extremely flexible but is dependent, in much the same way as Delphi technique, on the ability of experts to provide meaningful estimates of event occurrence probability.

- **Morphology Analysis**

This is 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, they list the different means by which each of these functions could be satisfied. Finally, they use the matrix to identify new, reasonable combinations of these means that could result in practical new product 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. IT can also be used to identify products and processes that competitors might be developing or considering.

- **Content Analysis**

Is founded on the concept that the relative importance of societal, political, commercial, and economic issues are reflected by the amount of media attention the issue receives. Thus, by measuring, over time, changes in such factors as column-inches in newspapers, time allocated on television, and, more recently, number 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 of use of this technique are often displayed in a quantitative format. However, they are typically used only for qualitative analysis.

- **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 an increased R&D activity, and that this, in turn, will be reflected by increased patent activity. Thus it is presumed that one can both identify new product technologies by analysing the pattern of patent application in appropriate fields. Results from the application are often presented in quantified terms; however, their use in decision-making is normally based on a qualitative evaluation.

- **Visualisation**

The individual act of creating a compelling image of some future process, possibility or event. Usually used to create positive inner states, attitudes etc. Has particular uses in healing and in recovery from illnesses such as cancer (Slaughter, 1996)..

- **Science Fiction**

A possible story of what could happen in some future social or world situation. Based on a scenario of some kind (i.e.: a possible sequence of events that 'could' happen in the future) to which characters (with their own personalities, even representing different alien species in some cases) interact with that sequence of events over time. Science fiction has replaced cowboy movies as an important genre of films today. Both dystopian and utopian science fiction stories are possible. Science fiction does not claim to predict the future, but sometimes good scientists (who know their topic well) intuitively write about something in science fiction that later becomes a reality. The most famous case is Arthur C. Clark and the communications satellite, which first appeared in a science fiction story.

Improvements To Existing Futures Methods

As a result of the workshops on methodologies and the subsequent discussion at the first Informan conference in March 2000, a number of suggestions were made on improvements and areas of attention in the forecasting methods used in Foresight. These are grouped into 4 points:

- Increasing the range of inputs considered
- Making use of existing resources
- Looking for discontinuities in existing trends
- Building network of expertise

Further details on these issues can be found in a report on 'Manufacturing Foresight Methodologies' which are the output from March 2000 Informan conference.

References

Helmer, O. (1983). *Looking Forward: A Guide to Futures Research*

Makridakis, S. and Wheelwright, S. (1989). *Forecasting Methods For Management*, 5th Ed, John Wiley & Sons, Inc.

McHale, J. and McHale, M.C. (1975). *Futures Studies: An International Survey*, New York: United Nations Institute for Training and Research

Nagel, R.N., and Wellington, J. (2000). *Proceedings of the IMS Vision 2020 Forum*, IMS International

Slaughter, R.A. (1996). *Knowledge Base Of Futures Studies*, The Futures Study Centre, Australia.