FUTURES RESEARCH — A LEGITIMATE ENDEAVOUR

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It is easy to yield to the temptation to denigrate the proposed Commission for the Future as an organisation which can produce or authorise "half-baked sociological analysis in the name of 'futurology' ".[1] Further, the rationalisation that "the future is unknown", or "the future is going to come whether we like it or not" is of little comfort.

Futures research is neither trendy nor the output of physics. It can offer a dimension frequently omitted in many policy and planning studies, namely, an explicit consideration of the changing and uncertain environment in which we eixst. This, of course, does not guarantee that we, as a society, will never make mistakes. It does, however, guarantee that many of the sources of change and their expected consequences will be considered *ex-ante* rather than *ex-post.*

The terms of reference of the Commission focus on scientific and technological change. Technological change, however, is not the only component which will impact upon Australia. Social, demographic, political and economic changes will all contribute. Computers and communications have changed, and continue to change, the way we do business and the requisite skillbase of the workforce. Equally, a slowdown in the net reproduction rate, not detected until Borrie's demographic projection in the mid-70s showed that accepted planning forecasts for Australia for the year 2000 were 'out' by as much as 25 per cent, altered the whole public sector resource allocations in health care, education and community development.

What is Futures Research?

Any definition is open to challenge. From a purely pragmatic standpoint, there are elements of futures research in planning, policy analysis, strategic analysis and new project development. All corporate and public decisions are based on a set of assumptions, often implicit, about 'the future'. Development of holiday and tourist resorts in the Northern Territory is predicated on a set of beliefs about the tourist and travel industries in that part of the world. Acquisition of defence equipment is based on threat scenarios. Configuring the power of transponders and the degree of switchability from national to regional beams on a national satellite system presupposes some knowledge of market demand. It is a matter of conjecture as to how well we have performed, and are performing, in such areas.

As a starting point, futures research is an iterative, ongoing process aimed at maximising both societal awareness and flexibility of choices. It involves:

- identifying possible sources of (future) change;
- structuring and assessing the potential elements of change;
- estimating the impact or consequences of the change; and
- providing relevant and timely input back into the policy or community programmes.

The special characteristic of futures research is that the subject matter (the future) is uncertain and any systematic study depends to a greater or lesser degree on subjective information. Extrapolation of quantitative time-series rarely identifies discontinuities or helps planners deal with a changing environment.

A Methodological Framework

The terms of reference of the Commission for the Future focus on technological developments and their impacts within Australian society. If we apply the general definition of futures research to technological change, there are a number of distinct phases in a futures study.

(i) Issue identification

This is the most speculative element in the process. It involves identifying a range of possible technological breakthroughs, commercialisations of technological processes, and trends, which, if they occur (or don't occur), will impact upon the system under study. For example, a large communications company in the USA addressed the specific question of trends and developments in the computer electronics and hardware and software industries as they may affect home information systems in the 1990s. The Association of American Medical Colleges asked the question of developments in computing and communications technologies as they may affect the training of medical personnel over the next decade.

An alternative formulation, and one more apt for a national futures commission is to start with national goals and objectives, where they exist, and identify events which must occur (or not occur) in order to achieve the stated social or economic objectives. This provides a framework in which to monitor and influence change and take timely offensive action, rather than to react passively to change.

There are no scientific techniques for this phase of the study. Brainstorming, nominal group techniques, lateral thinking exercises, interactive work-groups of 'experts' can be applied successfully to generate a challenging and comprehensive set of issues. It is at this stage that the futurologist or science fiction writer can construct

scenarios which challenge the assumptions of extrapolating the present. Because we are attempting to understand the extent of possible change, it is inappropriate to restrict the focus or boundary of the search activity too soon, i.e., to introduce traditional analytic or scientific assumptions and so 'limit' the problem space.

The selection of the 'sample' to participate in the various formulation and assessment tasks needs careful consideration. In some studies panels of experts were used. For example, a panel of the world's top experts in oil-price movements was interviewed on a regular basis. In others, a random sample of members of a profession was used. In still others, representatives of a corporation comprised the participants. The selection process should match the purpose of the investigation — usually to provide insight and robustness to a formal analytic process.

(ii) Structuring and assessing issues

The 1970s was a period during which technological forecasting became fashionable. The concern was to identify long-term growth trends in the energy, aviation, communications, computing, weapon and missile and bio-technical fields. Techniques included the application of statistical growth models, exponential and logistic functions, as well as the development of dynamic interactive simulation modelling. More often than not, these techniques offered an explanation for past growth rather than a prescription for the future. To supplement these techniques and allow for subjectivity within the forecasting and assessment processes, procedures such as delphi, modified delphi and event/trend assessment were developed.

Conceptually, the steps in the analytic process are:

1. Formulate the issues/items identified in (i) into concise, unambiguous and unconditional statements. Two types of issues usually emerge — trends and binary events.
2. Specify the instruments of assessment. The most common element is a subjective measure of probability of occurrence of an event — 'a 32 bit microprocessor will be available for less than $100'. Since the time dimension is important, the probability is usually linked to occurrence by one (or more) points in time, for example, by 1990 or by 2000. Other measures, such as importance, desirability and significance, are intentionally value-laden and become useful in identifying the direction of change which different groups within our society would like to see occur.
3. Collect assessments. Procedures range from successive rounds of mail questionnaires to real-time on-line computerised processing of the input. The objective, however, is usually simple. It is to classify issues and to understand the reasons why there are differences in

the assessed measures, such as probability, desirability and significance.

4. Identify interactions. The assessment procedures described above consider each issue independently. In fact, many issues are interrelated causally. Procedures such as cross-impact analysis allow at least first-order (or pairwise) interactions to be included. By partitioning issues it is possible to construct causal diagrams or patterns and to determine the strength of the interactions.
5. Construct scenarios. The above steps, although sometimes performed in isolation, provide the key input to the construction of scenarios. Techniques for scenario generation range from heuristic or creative writing to formal quantitative procedures using dynamic simulation or linear programming techniques. The aim is to paint a picture (or number of pictures) of the future based upon the explicit findings of the issue assessment and cross-impact analysis. By varying assumptions, or by monitoring changes over time, it is possible to generate new scenarios. Desirable or undesirable scenarios may be constructed and, if quantitative procedures are used, scenarios may be ranked in terms of their likelihood of occurrence.

(iii) Systems impact

So far the futures research methodology has been considered in isolation. The exercise takes on significance when the scenarios are linked to the system — macro systems such as the education system or the health care system, or micro systems such as a single corporation. The procedures for this stage are usually qualitative. Insight is gained through discussion groups and presentations (the late Herman Kahn produced his series of books. *Future of (Japan) (Korea) (Australia)* etc.).

However, some formal techniques from operations research and decision analysis can be applied in selective situations where it is possible to articulate a set of objectives, describe the system in terms of a number of quantifiable parameters and identify a range of alternative strategies. The effectiveness of each alternative strategy may then be assessed for each given scenario.[2] A trade-off analysis reveals the strengths and weaknesses of each strategy.

This does not complete the role for futures research. A key element is the ongoing tracking and monitoring of trends and events and continual refinement to the scenarios, and consequently, system behaviour, as new issues arise. An objective of futures research is to ensure that options are not foreclosed prematurely.

A variation on the above process is a technology assessment. The National Science Foundation in the USA commissioned a number of

technology assessments on personal computers, teletext and videotex, electronic messaging and electronic funds transfer. In the teletext and videotex study, the research question was explicit: What are the public policy consequences of widespread implementation of teletext and videotex?[3] The study proceeded as follows.

First, the technology was considered in its constituent parts, such as transmission network, database and receiving equipment (modem, VDU, printer, storage and processing capability) and 10 year trends were developed. Second, the current market applications for teletext and videotex were described and brainstorming sessions were held to identify new potential uses for the technology. These were matched to the technology forecasts to provide a series of market/technology scenarios; an immediate insight being that different videotex appiications (such as electronic messaging, information retrieval, electronic transactions and data processing) would be best provided by different technological configurations.

The scenarios were the input to the policy analysis which itself was considered in three stages: development, consequential and transformative. Developmental policies were those arising as the technology was introduced, the most significant being technological standards. They required early action — action which would influence the development. In the USA, for example, the overwhelming concern with introducing a new North American Standard (NAPIPS) virtually killed the UK Prestel system but proved uneconomic as a mass market medium.

The second stage in the policy process was to consider the policies which arose because of the implementation and widespread use of the technology; for example, privacy and security. Finally, the study attempted to tackle the longer term question: What are the transformative effects on society (home, school, office, leisure) assuming mass market penetration?

(iv) Feedback to the policy process

This needs little elaboration. It is the dimension which is most clearly defined in the Commission's terms of reference and, while difficult to accomplish, it is also an area which is well developed and frequently written about. Futures research, like any other pursuit, has not always been successful. Nor is it free of criticism. Because its specific focus is the future, the formal discipline has sometimes been confused with futurology or astrology. At a more mundane level, governments and organisations are continually committing resources or formulating policies based on an expectation of the future. It is the aim of futures research to provide procedures and methodologies to help in this process.

And so to the Commission for the Future

The terms of reference of the Commission emphasise the very important function of communication — to promote community awareness and understanding, to stimulate discussion and debate, to disseminate information and to report to Parliament. This is an admirable and necessary objective; one not always easily accomplished. For years, the project reporting phase of the National Science Foundation grant process was viewed as a requisite punishment for undertaking a study. It was frequently neither timely nor made readily accessible.

In addition to communication, the Commission needs a substantive basis. This should be built on the methodologies and processes which fall within the futures research domain and, given the focus on technology, the areas of technology forecasting and assessment. The field of study is eclectic — its strength and also, for purist disciplinarians, its weakness.

The Commission has a unique opportunity to do more than track and monitor technological developments and provide information as to how society can *react* to change. The Commission can use futures research methods to help corporations, individuals and governments *create* the future. That is, by anticipating trends and technological changes and by assessing their likely impact in a timely fashion, it is possible to create an environment in which change can be accommodated rather than rejected. Smooth implementation is not guaranteed, but an informed and constructive approach becomes possible.

REFERENCES

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