The most fundamental aspect of introducing uncertainty in the strategic equation is that it turns planning for the future from a once-off episodic activity into an ongoing learning proposition. (Van der Heijden, 1996: 7)

Long-range forecasting (two years or longer) is notoriously inaccurate. (Hogarth and Makridakis, 1981: 122)

Buy Futures. (Airbus advertisement for the A380)

Learning objectives

After reading this chapter you will be able to:

- assess the limitations of the information available for strategy making
- recognize what kind of information is relevant to strategy making
- learn how to read the general environment
- understand what is involved in forecasting the future
- identify the different kinds of risks to which the enterprise is exposed
- build different scenarios of the future

Key strategic challenge

What do strategists need to know?

That there is an absence of any systematic attempt to predict what will happen in the future and as a result a significant failure both to take advantage of important new opportunities and manage the risk arising from unanticipated threats.
The production of civil airliners is an industry in which there should be strategic planning, mainly because of the need to look a long way into the future and commit enormous resources to projects which only produce a return with a significant time delay.

This applies to the demand side, where it reflects the need of the purchasers of civil airliners, the airlines, to plan in a coherent way the development of their fleets well into the future, despite considerable short-run volatility of demand from potential travellers, and remain competitive in both the price and quality of the service they offer.

It also applies to the supply side where there is a need for planning because of the enormous commitment of resources required to develop a new generation of airliners. Initially, this usually means a pioneer model and later the associated family of related planes of differing range and size. The existence of such a full suite of planes is critical to eventual success, since it allows the enjoyment of significant economies of scale for various components, both at the production and maintenance stages, and also in the training of crew to operate the new planes.

No manufacturer can afford to make a mistake over such a large commitment of resources. Avoiding a mistake means reading the future correctly.

Airbus Industrie began in 1970, significantly the same year that saw the first commercial flight of the jumbo jet, the Boeing 747. It began as a consortium of European companies from different countries, notably Spain, Germany, the UK and France, which was established to compete with American civil airliner producers of that time. The competition for Airbus has always been American. When Airbus started there were three significant manufacturers in the USA – Lochheed, McDonnell-Douglas and Boeing. The first two merged and the resulting company was then taken over by Boeing in 1997, leaving Boeing the sole American producer. The industry is now a duopoly.

Airbus sought to integrate the different European industries. British Aerospace only became a full consortium member in 1979. Two of the consortium members, DAS (a DaimlerChrysler company) and Aerospatiale, merged in 1999, to become the European Aeronautical Defence and Space Company. On July 11, 2001 Airbus became a single integrated company, a French simplified joint stock company or SAS (Société par Action Simplifiée), with it headquarters at Toulouse in France. There are two main shareholders: EADS owns 80% of the company and BAE Systems 20%.

Airbus claims to be the first genuinely European company. There was considerable government involvement in its inception and development. The partners received generous subsidies from their governments to finance Airbus projects and ensure the consortium’s long-term survival. For the development and manufacture of its first three models, government assistance to Airbus amounted to as much as $10 billion. A further $4–5 billion was needed at the start of the A330/340 project.

Such assistance threatened to generate a trade war, with the American manufacturers arguing that Airbus was in breach of GATT rules. They claimed that Airbus had an unfair competitive advantage because of the subsidies received. Allegedly, the subsidies allowed Airbus to set unrealistically low prices, offer concessions and attractive financing terms to airlines which bought its products, and write off development costs without detriment. It was also alleged that Airbus had a captive market, in that it could use state-owned airlines to obtain orders. In response, Airbus argued that the American government had indirectly subsidized Boeing by financing military development and the associated contracts. The 707 was originally a military project.

A bilateral agreement between Airbus and Boeing was finally reached in 1992 which represented a recognition that any subsidy war was a ‘beggar my neighbour’ policy from which neither Boeing nor Airbus could benefit. The agreement limited government subsidies to Airbus to 33% of total development costs, while at the same time restricting indirect R&D funds to 3% of the total revenue received by the American manufacturers. Although European governments have continued to support Airbus, they have kept within the terms of the bilateral agreement. For example, the main four participant governments have made US$4 billion available in development loans for the A380 project, the main focus of this case study, a sum to be repaid from sales revenue. Nor has the American industry resurrected the issue since 1992, despite efforts by both individual politicians and government members to do so.

However, a second critical confrontation arose when the proposal for Boeing to merge with McDonnell-Douglas was made in 1996. Airbus objected on the grounds that the merger violated the rules of fair competition.

Without government involvement, the Airbus consortium would never have counteracted the first-mover
advantages of the American industry. The barriers to entry into the industry were such as to make that assistance critical. After 25 years of losses Airbus finally made a profit in 1995. Although the respective European governments are still important for its development, it now acts as a fully private and competitive company. To survive as such it is essential that Airbus reads the future correctly. With the commitment to the A380 project, Airbus has read the future demand for airliners very differently from Boeing. Each manufacturer has its own model of the future, forecasting the demand for airliners 20 years ahead. For Airbus it is critical that the project has been initiated on an accurate forecast of future demand.

Chapter 2 considered significant constraints on strategy making, in particular the cognitive or intellectual, social and political contexts which influence the strategy-making process in any organization, constraining what can and cannot be done. This chapter expands on the first constraint, the cognitive, exploring the imperfect information available to strategists and the limited ability of any one individual to process the mass of available information. Any organization has a limited information-processing capacity. This chapter considers what a strategist needs to know in order to make good strategy. It stresses the nature of strategy making as a learning process and an organization as a learning institution. The major area of ignorance is what will happen in the future. Since most of the life of any organization lies in the future, this is important. There is no way of avoiding the problem of uncertainty about the future. How does a strategist deal with this uncertainty? One response is to try to remove as much of it as possible.

Strategy makers operate with imperfect information. To a limited degree, they can choose the degree of imperfection with which they operate; that choice is itself a strategic issue. However, whatever they do, they cannot possible know with certainty what is going to happen in the future, nor can they know the exact degree of their own ignorance. Are they right even on those things about which they are confident? Strategists cannot possibly attain what is called ‘perfect information’. The challenge for them is to know enough about the future to give any strategy adopted a good chance of success. They must be able to make a strategy flexible enough to accommodate the unexpected events which lead to failure, in particular those which come as a surprise.

In a world of apparent information abundance, the message of the first paragraph seems rather paradoxical. The problem for any strategy is rather more than just the limitations on available information. There is a sense in which there is far too much information. The strategy maker is faced with a limited capacity to process the information which is available; there is far too much of it. Probably only a small proportion of all the information available is relevant to the enterprise or organization.

Together, these two limitations, imperfect information and a limited capacity to process the information which does exist, constitute bounded rationality. The successful application of reason depends on the availability of relevant information; it is bounded by the existence of imperfect information and an imperfect capacity to process what does exist in order to discover what is relevant.
Rationality involves two types of reason, the pure and the practical:

- **Pure reason** involves the application of a particular style of reasoning and argument to problem solving, one which uses the normal criteria of logic. It involves the deduction of true inferences from a given set of axioms or propositions.
- **Practical reason** involves the application of reason to the problems of action. Such problems involve achieving clearly set out objectives in a logical manner, effectively using the resources available, given the circumstances or environment in which the appropriate action must be taken.

Decision making in strategy making is a form of practical reason.

Simon has distinguished substantive rationality from procedural rationality:

- Behaviour is substantively rational ‘when it is appropriate to the achievement of given goals within the limits imposed by given conditions and constraints ... Given these goals, the rational behaviour is determined entirely by the constraints of the environment in which it takes place’ (Simon, 1976 quoted in Forster and Browne, 1996: 159).
- Behaviour is procedurally rational ‘when it is the outcome of appropriate deliberation. Its procedural rationality depends on the process that generated it’ (p. 160).

**Focus on Theory**

**The criteria of rationality**

- Rational decisions are conscious, explicit and deliberate.
- Rational decisions must be free from errors of logic, that is, they must be internally consistent and logical.
- Rational decisions are fully informed, taking comprehensive account of relevant information, particularly about the context in which action is proposed to be taken.
- Rational decisions are goal-oriented, that is, they are purposeful, aimed at the achievement of a preferred end.
- Means and ends are analytically independent, that is, the choice of ends is independent of the means for achieving them.
- Rational decisions involve choice between alternative ends as well as between alternative means for achieving them. The choice of means will be determined by the evaluation of alternatives in terms of the ability to achieve to a maximum degree the chosen ends. Rational choice therefore implies maximization.
- Means and ends are causally related, that is, rational decisions depend on the action taken being reliably expected to result in the achievement of the stated objective.

Source: Forster and Browne, 1996: 160.

**Optimization**

One variant of the rational approach assumes that all problems can be reduced to problems of optimization. Optimization is one way of achieving defined goals within the constraints of the existing supply of available resources. It assumes that there is a clear maximand or minimand, something to be maximized like output or profit or something to be minimized like costs or inputs. It assumes that there are a number of possible solutions but that there is just one optimal solution to any problem. It is
simply a matter of discovering the optimum solution. There are various techniques for doing so, which are not very helpful in strategy making because the nature of the problem means that is does not satisfy the assumptions above.

In all sorts of areas of human activity there are problems which are solved by rational thinking; for example it is at the core of science and its advances (Figure 4.1). Some see strategy making as nothing more than an application of reason (Singer, 1996). Is the application of reason at all feasible, or even desirable, given the difficulties of defining with precision both objectives and resources in the world of strategy?

One position is to accept that decision making should aspire to be rational but that the application of reason has its limitations. Rationality only takes the strategist so far. Beyond this point strategy making enters the world of creativity, with all that involves. This dichotomy has already been discussed under the heading of strategic thinking in Chapter 2. All the activities in which reason is important have an element which is beyond reason, one which is genuinely creative. The element of creativity necessary in both determining objectives and creating the resources necessary to achieve these objectives moves the analysis beyond routine applications of rationality and embraces a much wider area of human motivation and behaviour.

At best rationality is subject to serious constraints, at worst it is impossible. These cognitive constraints need to be added to the social and political ones already discussed in Chapter 3. There appear to be severe limitations on what can be achieved in following such a narrow approach. These limitations arise from constraints distorting the process of decision making itself.

Many economic models of human behaviour assume not only that perfect information is available to all market actors, whether they are consumers or investors, but also that all actors behave rationally. Such actors are assumed never to be inconsistent, to act on a whim, a momentary sensation, intuition or what we might call a gut feeling. It is not simply that they know fully their own preference map (their ranking...
of consumer goods) and the price of all products, but that they apply a set of easily
deducible criteria to decision making, one which includes consistency.

A typical approach which illustrates the weakness of an overreliance on rational-
ity is the notion of an efficient price. Indeed this notion is one which assumes that the
actual price existing in any market reflects all the relevant information on both
demand and supply conditions available at that time. It is efficient in that sense. It is
often argued that individuals cannot do better than the market in anticipating future
price movements because they cannot possibly have more information than the
market. Prices change as soon as the market receives new information. It is conceiv-
able that the amount of information available, and therefore the price, can change
dramatically and quickly.

This view of an efficient price defies common sense. Such an assumption under-
mines the very nature of management studies. Its acceptance would reduce severely
the discretionary element in business decision making. It also runs contrary to the
reason why strategy is valuable to an enterprise. Anyone concerned with real
business decisions and the associated managerial behaviour must have a different
starting point.

There are four elements of an alternative starting point which need to be emphasized:

1. Rationality is not the only ground for making a decision, and is often mixed with
other grounds. The previous discussion on creativity neatly illustrates this.
Because information is necessarily imperfect, there may be very good grounds for
not limiting oneself to rational arguments. This applies to all players who make
their own strategy.

2. No strategic player has immediate access to anything like perfect information; but
access can be improved in a number of ways. It is possible to have access to differ-
ent amounts of information or deliberately increase the amount of information
to which you have access. Therefore access to information is itself a variable.
Making an effective strategy depends on having better information than competi-
tors or processing and therefore using it better.

3. Even if these actors had access to perfect information, their capacity to process
that information is limited. Again there is a variable amount of processing which
can be applied to that information. Effective processing may give the strategist the
advantage he or she seeks.

4. Prices may be efficient in the limited sense indicated above, but the inadequacies
of that information render this a meaningless definition. There is an inherent
uncertainty about market behaviour, and in particular enterprise behaviour,
which itself creates an uncertainty about price. Price fixing is a strategic matter
which can and should be analysed in advance.

All these are issues which must be taken into account in any realistic approach to
strategy making. Strategy concentrates attention on the future, or at least on infor-
mation concerning the future. Imperfect information about the future generates
uncertainty and risk. There is a common distinction made between risk and uncer-
tainty. Risk occurs in a world in which different outcomes have calculable probabil-
ities, whereas uncertainty occurs when you have no idea of probabilities – you simply do not know whether an event will occur or not. Risk allows rational decision making, uncertainty does not. In this sense the world of the strategist is more an uncertain world than a risky world. This accords rather better with a common-sense view of the world.

What can be said about uncertainty? The key starting point is that the level of uncertainty is never binary, that is, there is never a simple either/or situation – there is neither zero uncertainty (complete certainty), nor total uncertainty (complete ignorance) (Courtney et al., 1997). Such a binary position itself oversimplifies the world. Instead there are in practice four different levels of uncertainty about the future:

1. the vision of an almost definite future
2. the recognition of a number of discrete, alternative futures which are possible
3. the awareness of a broad range of possible futures, with clear boundaries which demarcate what is at the limits but a continuity of possibilities within the limits
4. an ambiguous future fraught with unknowns, a state of near complete ignorance.

By one’s own actions it is possible and obviously desirable to move from one state of knowledge about the future to another, in so doing reducing the level of uncertainty. This requires an information strategy which takes the observer as close as possible to the first of the four states. Usually the aim is to move from an ambiguous future to a defined range of possibilities, or from a defined range to a limited number of possibilities. What is possible may differ markedly from one part of the economy to another. The observer should try, through, for example, the process of scenario building discussed below, to have a clear view about the future.

Today there is access to much more information than in the past. Certainly the mechanisms of access have expanded enormously to include electronic media as well as a vastly increased face-to-face contact. Today all potentially suffer from information overload. There appears to be no limit to the amount of information available through the different media. The bulk of the available information is overwhelming. This constitutes both a source of opportunity and uncertainty.

Theoretically, everyone is much better able to understand what is happening now. There is much less of a monopoly over access to information, that is, a democratization of information access. However, the greater volume of information, by creating an enormous amount of background ‘noise’, makes it more difficult to hear a significant message loud and clear, even if you are aware in the first place that there is such a message. The noise obscures the message. It is critical who hears the message because the expertise of the hearer will determine whether the message is recognized for what it is and correctly interpreted. There are a host of messages, some of which go forever unheard.
This means that the notion of perfect information is hypothetical; it never exists and never will. The common condition is a general state of imperfect information, which has a profound influence on behaviour and strategy making. To dispel even a small part of such ignorance requires a significant investment of time and resources – itself a strategic decision as to how many resources to devote to the process of converting information into knowledge. The returns from such activity can never be known before the event, only after. Since each conversion is unique, it is only possible to learn about the potential in a general way.

Raw information is not knowledge, it only becomes knowledge when it is put into a theoretical framework, or rather placed within a strategic dimension. It is the strategic framework which yields the criteria for selection. It is a chicken and egg situation, in that strategy is impossible without the relevant information and its conversion into knowledge, but the relevant information only becomes knowledge within the context of the strategy itself.

The cost of most information is very low – in many cases it is costless. The communications revolution has massively speeded up and reduced the cost of the storage, transmission and retrieval of information. While in its raw form, information is apparently costless, in practice its conversion into knowledge bears a significant cost. Since it must be processed, the real cost is the time devoted to the process of reading and interpreting that information. It is necessary to analyse the process of reading this information which makes possible the conversion; this is an important strategic activity.

The aim of reading the general environment is to identify, at least in general terms, opportunities and threats specific to the organization which might emerge in the future. It is impossible to keep abreast of all future developments, nor are all developments relevant to a particular enterprise. Reading is therefore a selective process, one which is a matter of judgement and experience. It is a critical one since circumstances can change quickly, for example as the result of a risk-generating event such as terrorist attacks, and the early identification of a change in trend, or even mood or atmosphere, may be the difference between success and failure. A good reader of the general environment is in a position to take advantage of opportunities and avoid the threats, thereby minimizing risk.

The reading of the general environment can be done by those employed specifically for the task or by others performing different duties. There is a massive task of selection which demands considerable expertise and enormous effort. The opportunity cost is the time, effort and resources devoted to processing the information, time which could be used for other purposes. This is just one element of what are often called search costs, the costs which are incurred in seeking the relevant information on potential transaction partners and the nature of possible transactions. Making such searches and incurring the relevant search costs are preliminaries to strategy making and the organization of the business transactions which realize any strategy.
Particular kinds of information are relevant to strategy making. There is a need to recognize opportunities and threats and then strategic actions either exploit the opportunity or counteract the threat. Recognizing a potential threat or opportunity is not easy. Reading the general environment for that recognition is a skilled task. There are three main stages in this recognition – selection, transmission and incorporation into strategy making:

1. The reader has to gain access to the relevant information. Initially the information may be in places normally inaccessible to the organization and its readers. It may also take the form of fragmented and superficially unrelated scraps of information which need to be put together from disparate sources. It is vital to be able to recognize the relationship between these fragments.

2. This information must be conveyed at critical times to the strategist and be seen as representing something of relevance to the organization. This conveying of information may be a regular or irregular process, structured into the process of strategy making or merely incidental.

3. The person must persuade the decision makers that the information merits a strategic response of some kind, for example its embodiment within a strategy.

All three stages involve ‘political’ relationships, not simply a transfer of useful information in a neutral manner. At each stage the motivation for what is happening may not be a simple desire to make an effective strategy. A particular reader may be selected in order to suppress information of a certain type and this may be well known to the reader; or the reader may be expected to confirm a particular view about future strategy. It is necessary to understand the expectations and interests of those involved in the identification, selection and transmission of such information.

One of the problems is that there may be considerable delay in the movement of information through the various stages of strategy making. This delay reflects a number of causes:

- Sometimes the reason is simple ignorance, a failure to understand what is happening, or even stupidity, either on the part of the reader or the strategy makers themselves.
- Sometimes there is dishonesty or corruption. There may be a motive for concealment. Acknowledgement of knowledge may require a recognition of previous mistakes, the admission that a senior person or persons was wrong. Some individuals may be profiting from the status quo in such a way as to make any acknowledgement of the information contrary to their interests.
- There may be general knowledge of a threat, but for a number of reasons nobody is prepared to respond. The culture of the organization may discourage rocking the boat. Previous success or the commitment of key figures to an opposite point of view may be the problem.
- In large impersonal organizations, the reader or the messenger may not have the standing to be believed. Shooting the messenger is frequent enough to deter indivi-
idividuals from becoming the messenger. Nobody may want to be the messenger, particularly if the messenger appears to be the bringer of bad news.

• The reader who wishes to remain the reader may also be apt to communicate what he or she believes is expected and/or what is acceptable, but not what might jeopardize a continuing and remunerative relationship with the enterprise.

All this shows that if information is almost costless, knowledge is expensive to acquire and therefore valuable to possess. It is expensive because it is generated by a process of reading the environment which requires both time and expertise.

Knowledge is valuable because it is specific and only a few have access to such specific knowledge. The value may diminish rapidly as others read the same message. If it were freely and immediately available to all, it would be without value. Strategy defines what that knowledge is and is based on the possession of such knowledge. Knowledge is the raw material from which strategy is made.

It is possible to break reading into four separate activities – scanning, monitoring, forecasting and assessing. This is rather an artificial distinction but it allows the isolation of the key features of the reading process. Each stage is important. In the end all the reading must be targeted in order to be useful. It can be assumed that all employees are capable of doing it, in appropriate circumstances. It might be a consulting firm, a public research organization, a specialist department in the enterprise or the key decision makers within the enterprise working together and providing an input relevant to their own domain, however narrow that might be. In the last case there must still be someone who puts together all the separate pieces of information.

**Scanning** is the process of acquiring, selecting and processing information which is relevant to the particular enterprise. Information does not stand out in an obvious manner, thrusting itself before the reader and offering itself for conversion into knowledge. It has to be analysed for what is relevant. Because of the amount of information, scanning has to be done quickly – a rapid and cursory review of incoming information rather than a deep analysis, but it must be an insightful review.

Any reader has preconceptions about the nature of the world. The world has been likened to an iceberg: a submerged foundation of structures which change only slowly: a higher level of trends or patterns which manifest the interaction of under-
lying structures; and above the surface, events which are the individual elements of such trends or patterns, although difficult to recognize as such. It is possible to have a good notion of the nature of the submerged parts but also be aware that sometimes those submerged parts change. The only hint of the change is to be found in the visible events (see the attempt in Chapter 5 to identify such trends or patterns).

The reader also has to select those bits of information which help to reveal significant new patterns. Of particular interest are those which are relevant to the part of the economy in which the organization operates. The information can come from a host of different sources, such as the Internet, newspapers, journals and magazines, or word of mouth.

Scanning involves covering of an enormous amount of ground and a sensitivity to any news item which hints at relevance. It must involve the use of ‘off-centre’ information which is likely to indicate unforeseen or previously unrecognized changes, information which is far more important than may appear at first glance. Much of what is read has already been processed and simply rehashes the known in various guises. It is necessary to consider what does not represent the conventional wisdom. Knowing what everyone already knows is not enough. The successful strategist knows already what nobody else knows – that in itself is a source of potential competitive or strategic advantage. However, it is critical to know more. This is not to advocate that everyone becomes a contrarian, although it recognizes the rationale of such an approach.

**Monitoring** requires the targeting of particular types of information as relevant. Interpretation of this information may lead to the identification of a new development as important enough to constitute a potential threat or opportunity. It may not be either yet but it has the potential to become so. The change may constitute a modification of the macroenvironment, that is, large enough to have a significant impact in the industry with which the monitor is concerned. For example, IBM should have been monitoring the development of the PC in its infancy, and Microsoft the development of the Internet at its birth. The development of the PC and its enormous potential to change the way communication occurs, or the way in which information is stored and processed, was clearly something a good reader should have spotted as early as the 1960s and 70s. Any information relating to such a development requires careful analysis to see how the issue is developing, whether it will in practice manifest itself as a specific threat or opportunity.

Monitoring often involves the application of theory to data, a shrewd reading of cause and effect. This requires a knowledge of the theory which enables an observer to trace a sequence of causal events. Some of this knowledge may be scientific, involving a deep knowledge of the potential of new discoveries, or it might be economic. It does not require a genius to link the ageing of the population of developed countries with an increased demand for medical and nursing care and pensions. Anticipating the direction of future change sometimes requires the application of such theory, whether simple or more subtle. The process is one of homing in on a particular sequence of developments and anticipating the future unfolding of those developments. For example, demographic change drives many of the political, economic and social tendencies which remake the environments in which relevant players operate. Demographic relationships are not difficult to read and are more robust than often thought.
The next stage is the attempt to forecast. This is so important that it is discussed at some length in the next section. Forecasting is difficult, even for a short period of one or two years. Stability of key relationships may allow the extrapolation of past trends – the relevant systems may remain dominated by predetermined elements. However, unstable times make forecasting very difficult as critical uncertainties emerge, for example the complex unknown of environmental factors. For longer periods it is almost impossible to forecast, except in very general terms.

Forecasting involves looking at the future in a systematic manner, notably at likely macro-change. It may involve generating the kind of scenarios indicated below, and then considering how such change is relevant to a specific enterprise. The scenarios may identify various change elements as driving forces – new political groupings, new fashions in policy, new technologies, extensions of and changes in the market or dramatically new patterns of consumer demand reflecting a new demographic picture. All these may constitute elements which drive the process of change. It is not difficult to recognize the driving forces which are at work in different parts of the economic system.

For example, it is easy to recognize the relationship between the nature of the economic reform process in China and its rate of economic growth, and in turn the relationship between this growth and China’s strategic role in both Asia and the world at large. It is also easy to recognize a general process by which growth slows as an economy nears the frontier of best practice, whether in technology or organizations. Japan’s current problems will likely apply to China 20–30 years into the future.

The final stage, after forecasting is complete, is to assess the direct relevance of the predicted changes to the competitive advantage held by the enterprise, or the risk environment in which the enterprise has to operate. A key issue is the interaction between the macro and the micro, the broad aggregative scenario and the specific scenario relevant to a particular industry. What do the macro-changes mean in terms of micro-change relevant to an enterprise? Such an ability to look ahead is vital to the ability to develop effective strategies. What opportunities will help in creating new competitive advantage or maintaining an old advantage? What threats are likely to undermine the viability of the enterprise or any of its activities?

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Focus on Practice
IBM, Fishkill and Fab (chip fabrication plant)

Currently a new best-practice plant to manufacture silicon chips, the basis for computing, communications and all consumer electronic equipment, can produce at a level which adds as much as 5% to total world productive capacity. The plant is large and costs US$3 billion or more to build, an enormous commitment of resources. From 300mm silicon wafers, such a plant produces something like three times as many chips as an older plant using 200mm wafers, with costs 40% lower. There are therefore very significant economies of scale which make it impossible for the much smaller, older plant to compete in a contracting or slowly growing market. IBM’s new Fishkill plant is best practice and capable of producing US$8 billion worth of chips a
The success of most human activity is based upon some measure of accuracy in ‘predicting’ future outcomes. As individuals in their everyday lives and as employees in business activity, all people do this as a regular part of their lives, but unconsciously. However, the future is by its nature uncertain; exact and successful prediction is impossible, but it must be attempted in order to attain business success. A sure failure will follow from assuming that nothing will change or failing to adjust to a general change in trends or the particular behaviour of a key player.

There are three distinct ways of thinking about the future:

1. To reject the possibility of, or need for, accurate forecasting. This is done on two opposed grounds:
   - It is impossible to forecast, particularly as change is rapid in most sectors of the economy. This contradicts common sense and would leave no room for an effective strategy.
   - The aim of the strategist is to create the future, or rather to recreate the present, not to take the future as a given.

   This second argument embraces a particular notion of strategy as revolution. In this situation what the strategist needs to do is to think ahead of action. In the words of Hamel and Prahalad (1994: 82): ‘To create the future the company must first be capable of imagining it’ and ‘Companies fail to create the future not because they fail to predict it but because they fail to imagine it’ (p. 120). This
view argues that the future is made by many strategists trying to implement their vision. This activity can be called foresight, the ability to think of the future as the potential outcome of specific strategy making.

2. To consider a limited number of possible futures, each reflecting a different way in which key variables might evolve over time. This is usually called scenario planning or scenario building, and assumes a finite and limited number of likely potential outcomes, which reduces the level of uncertainty significantly. It is possible to say something meaningful about the future, which helps to anticipate and prepare for that future. This approach is premised on the notion that there is sufficient stability and knowledge of the future to construct different scenarios, different stories of how the future will unfold. The Royal Dutch Shell Group pioneered this way, making explicit a process of scenario building which is often left implicit. There is no doubt that scenario building is implicit in the way most strategists have dealt with the future. Scenario planning can fill the gap in knowledge.

3. To predict exactly. There are areas where prediction can take the form of forecasting, that is, the exact prediction of an outcome or the attaching of exact probabilities to possible outcomes. There are more of these areas than often thought:

- Demographic behaviour has unchanging elements which make it possible to look quite a long way into the future, forecasting the size and structure of populations with some precision
- Technical change also has stable elements which make it possible to foresee the general nature of a future economy
- Organizational structures have considerable continuity.

In other words there are a significant number of macroparameters which constitute unchanging elements. At the microlevel some industries are mature and slowly changing. They display little development in market conditions or technology. There are clear microparameters within which the organization operates.

Many of the successful predictions that individuals make appear banal. They are constantly ruling out a host of possible future events, doing this automatically, assuming that from day to day there is a considerable repetition of behaviour. This allows the development of routines. Human beings have a propensity to routinize their activities, partly because this makes life liveable and partly because it is a source of control, security and efficiency. Such routines allow everyone to save the time and effort otherwise spent organizing the minutiae of everyday life. Also they prevent paralysis as the result of the threat of the worst happening. However, such routines can become inappropriate if unexpected events occur.

It is a reasonable assumption that risk-creating events do not usually occur. In many areas the present reproduces the past and will continue to do so well into the future. Stability in any pattern of human behaviour depends on this characteristic. The persistence of any culture or set of institutional arrangements demands a strong measure of such stability. However, cultures, corporations or individuals can threaten their own survival chances by failing to change or adapt to a changing environment.
Often it is easy to predict that a certain event will occur at an indeterminate date some time in the future. Many of the superficially unexpected events of the recent past were not in themselves surprising, but it was difficult to predict their exact timing. Successful prediction requires more than a statement of eventual occurrence, it requires the specification of the exact timing of the event. From a strategic and business perspective, timing is of the essence. It is often easy to make a vague prediction; it is much more difficult to specify the precise timing. Getting the timing right is often the difference between success and failure.

What is often surprising is the speed with which an event unfolds, such as the oil price hikes of 1973 and 1979 or the collapse of the Soviet Union. A political system may be observed as under stress but its collapse may be sudden and unexpected. It is often obvious that an overvalued market will see a correction in the future, but when will it occur?

In the business world, decisions involving investment of any kind necessarily reflect a view about the future, a comparing of future income and cost streams and often an implicit prediction that certain events will not happen. Nearly all decisions made in the business or economic areas involve reading the future in some way.

**Focus on Theory**

The time horizon

It is necessary to expand on the significance of the time horizon. There are commonly three different time perspectives, into which any specific strategic future can be divided – the short, medium and long term.

- In the short term, say the next two to three years, predetermined elements may outweigh uncertainties in importance, allowing successful forecasting and possibly even a significant level of strategic planning.
- In the medium term, say three to ten years, the number of predetermined elements diminishes and that of critical uncertainties increases, with the result that forecasting usually becomes impossible and scenario building, as described in the text, becomes appropriate and critical to successful strategy making.
- In the long term, there are almost no predetermined elements but many uncertainties so that strategy making often becomes a waste of time. However, an exercise in strategic thinking might find it useful to consider this far ahead, especially if the nature of investments in the industry involve facilities which last this long. The best that can be done is to trace out the unfolding of the main forces for change.

The length of the various terms in years depends upon the nature of the industry and the pace of change in its environment. If change is rapid, as in the communications sector, the short term is very brief. If the industry is a mature one, changing very little, the short term is likely to be relatively long. In that case predetermined elements will be dominant and critical uncertainties few and weak. The goal of a strategist is to lengthen the short term, in order to expand the scope for strategic management, and to bring the long term within the perspectives of the short or medium terms. The means for achieving this is to reduce the level of uncertainty by reading the environment appropriately.
Focus on Theory

By its nature strategy relates to the future. How far should a strategist look into the future? It is useful to ask a series of rather obvious strategic questions which help to answer the bigger questions:

- **How long does it take to design a new product and put it on the market?** The time taken depends whether the new product uses the existing competencies of the enterprise. It also depends on the sophistication and complexity of the product. In some cases, where no new competency is involved and in an industry in which the turnover of new products is swift, the time period might be very short. However, in other cases the period is much longer. Ten years is not a long period for an airliner or a motorcar, if the innovation is to introduce a whole new family, much shorter if it is a variant within an existing family. Even a pharmaceutical product takes up to ten years to develop and put on the market.

- **How long does it take for an enterprise to completely change direction, that is, to change an underlying generic strategy?** This may involve developing competitive advantage in completely new industries and acting strategically in a completely different way. The period may be five or six years if it is a well-developed strategy.

- **How long does it take to change a corporate culture, and/or restructure an enterprise?** Probably even longer, maybe ten years if it is to be done effectively.

- **How long does it take to create a new brand name?** Sometimes months, more probably years and on occasion decades.

All the changes which have significant strategic implications take much longer than usually assumed. Often there is a minimum time period of five years, sometimes ten years might be required. Strategic management or planning, rather than strategic thinking, involves much shorter periods of time. Strategic planning may be relevant only in the shortest of periods when the stream of events is predictable.
All successful enterprises surviving for a significant period of time anticipate future events with a degree of accuracy sufficient to avoid the full negative impact of significant risk-creating events. They also anticipate the conditions of opportunity under which they can create a temporary monopoly sufficient to generate a stream of above-normal profits, in whatever area they are operating. In other words, they can make a strategy which both ensures survival and, beyond that, significant enterprise development.

There is, however, a potential for prediction built into any theoretical model of behaviour. Recognizing and identifying causal mechanisms allow an observer to follow a chain of events as they unfold. Practically, and perhaps intuitively, some get it right sufficiently frequently to reap impressive rewards – witness Warren Buffett, for example – but generally the record is poor. There is a paradox in the contrast between the need for implicit prediction in many areas of life, indeed in any area which involves decisions with implications stretching well into the future, and the
limited success of explicit attempts to actually predict on a systematic basis. It is important to have a clear understanding of the limitations of prediction.

There is one area where prediction is a precondition for success and a continuous process. The commercial offer of insurance is an area which, for its viability, depends on successful prediction. What is predicted is the typical behaviour of large numbers of people, not specific individual scenarios. Insurance has been on offer for many centuries. Predicting actual outcomes for one particular individual, enterprise or society is one thing, predicting a probabilistic outcome for many is another. Insurance profits from the law of large numbers. Insurance is possible where there is a sufficiently large body of data and low probability of an event occurring to make premiums small enough to be affordable and claims infrequent enough not to create even a temporary financial embarrassment. Successful insurance requires a repetition in broad terms of past behaviour. The future in some sense reproduces the past and can be extrapolated from that past. Nevertheless, the unexpected can create losses even for insurance companies, as can be seen in the Strategy in Action on Lloyd’s in Chapter 14.

Focus on Theory

Public or professional liability

Insurance requires a clear view about the probability of certain events happening in the future. Insurance against public or professional liability is an essential risk management strategy (see Chapter 14). It is extremely difficult for any organization, either public or private, or indeed for any vulnerable professionals, such as doctors, travel operators or sportspeople, to operate without a public or professional liability insurance. This also applies to those who organize festivals, carnivals and special events of various kinds.

Such an insurance provides a means of controlling a particular kind of risk and guarding against the negative consequences of the occurrence of certain risk-generating events. The ability of a person suffering harm of some kind, whether a customer or not, to sue the responsible agency for negligence creates the potential for very large losses for that agency, which it is better to guard against. Negligence arises because of a failure to maintain the quality of a facility or service, a failure which might result in injury or damage of some kind. The same principle applies to the conditions of employment and their impact on workers. Or it might apply to the provision of services by various arms of the government. A pedestrian tripping up on an uneven pavement can be a cause for litigation against the local authority responsible for the pavement.

There are three separate problems which contribute to these difficulties and therefore potentially the costs of the organization, all involving an element of uncertainty about the future and therefore ignorance:

- The degree to which individuals, sometimes encouraged by certain law firms, are litigious. How likely are those suffering injury to sue? How far do those held responsible accept responsibility for the consequences of risk taking?
- The frequency of such events. The problem is twofold:
  1. There may be a long period between cause and effect, such that the initial cause is not immediately recognized as such. The effects are long-tailed. They may go unrecognized for a significant period of time. They may threaten a large number of people in a completely unforeseen manner.
  2. Which events should be counted?
- The attitude of courts, since they define the nature of negligence and the penalties imposed. In the nineteenth century the courts in the USA usually found against...
Successful strategic thinkers must have a view about the future. They should be able to read when human behaviour is stable and can be relatively easily anticipated, including the special case when the law of large numbers allows easy interpretation of probabilities or when theory provides us with sequences of linked cause and effect, confirmed by empirical analysis. In such a case change is described as \textit{endogenous}. They must also be able to read when there is a good chance of a change in trend, or an event indicating such a change, which has the potential to remake a significant part of the environment. Such thinkers also accept the inevitability of the occurrence of some events which can only be described as \textit{exogenous}, those without obvious immediate cause and not part of any obvious pattern of past behaviour. On deeper analysis there are few such events. The vast majority of unforeseen disasters which have afflicted enterprises should have been anticipated by them. The aim of the strategist is to convert all exogenous events into endogenous ones by finding a theory which helps to predict the chain of events. The aim, in the words of Watkins and Bazerman (2003), is to convert unavoidable surprises into predictable surprises.

There are good reasons why prediction often fails, but it is not because it is impossible to predict. In fact, the reasons for failure are easily understood and thus can be addressed. The failures arise in three main areas:

1. \textit{recognition}: not identifying the threat in the first place
2. \textit{prioritization}: not according the threat the significance it deserved, even if you recognize it
3. \textit{mobilization}: not committing the resources needed to cope with such a negative event.

This chapter is concerned with the first two areas. Scenario building, as described below, can deal with them. The reasons for failure are:

- \textit{psychological}: resulting from various cognitive biases, usually the result of a self-serving orientation which means that we see the world as we want it to be, not as it is.
• organizational: resulting from the fragmentation within any large organization of information and responsibility, a tendency which means that nobody sees the whole picture
• political: resulting from flaws in the decision-making process which allow interest groups to push their own barrows.

The implications are obvious. Any prediction process must be structured to avoid them. It should include outsiders to stop the self-serving bias of insiders, and involve cross-functional and cross-departmental teams to stop fragmentation.

There are various ways in which a strategist can deal with an uncertain future. In some way the strategist must construct a likely future and then run a strategy against this construction. The strategist has as his or her goal the translation of information about future events into knowledge. This involves a process of selection of the relevant information.

There are three main methods of doing this. The first two involve running different strategic options to test their robustness to changing external events:

1. **Contingency testing** assumes the prior existence of a strategy and involves testing its robustness, its vulnerability to various contingencies, that is, the occurrence of various events. In this the strategist evaluates the effect of a given contingency on the strategy, that is, any event or set of events which may cause serious difficulty in the achievement of the objectives of the strategy.

2. **Sensitivity analysis** in which the values of different key independent variables are varied to test which ones are critical to strategic performance. One such variable might be the level of demand for the product(s) or the cost of a vital input. Some variables can change by a large amount but do not have a serious impact on strategic outcomes. Others require only small changes to have such an impact. Again this assumes the previous formulation of a strategy which is then tested for its robustness.

3. **Scenario building** which is more ambitious in its scope than the previous two but is ultimately the only approach which directly confronts the uncertainty of the future. Scenario building does not assume the previous existence of a strategy. Scenario building has an important strategic role to play. It can be used to encourage staff to become keen readers of the environment.

### Different kinds of risk

Uncertainty about the future creates an environment of risk for the enterprise. In this context, risk is interpreted to mean the possibility of some unforeseen event imparting a significantly negative effect on a key performance indicator, such as profit.

Risk-generating events are common and constitute part of the environment of every organization. Risk exists at all levels of society. There are risks which could be regarded as specifically global and those which are national, industrial, organizational or even individual.
There is some evidence that global threats are appearing with increasing frequency and having a more significant impact than in the past. *Global risk* takes a number of different forms:

- epidemic disease, whether human, animal or even plant, which does not respect national boundaries. These have been around for millennia. There are numerous examples: for humans, AIDS, SARS and new virulent strains of malaria; for animals, mad cow disease and foot-and-mouth disease; and for plants, rusts and smuts and, specifically for vines, phylloxera.
- general economic depression, the last major case being the Great Depression of 1929 and after. Some financial crises, such as the Asian economic crisis of 1997, only affect particular regions of the world.
- world war, such as the two wars of the twentieth century in 1914–18 and 1939–45 or a war which expands beyond a single country either in locational impact or the level of involvement of other countries – the Gulf War of 1991 certainly qualifies, the Iraq War of 2003 probably.
- acts of international terrorism.
- the impact of global warming and other environmental damage, such as acid rain and the depletion of the ozone layer.
- a virulent computer virus.

Such risks consist of threats which extend beyond international frontiers, and cannot be dealt with solely on a national level, but require global control. However, because of the weakness of international organizations and international law, they usually have to be dealt with at the national level and by ad hoc international cooperation between the affected nation states. The rising importance of such threats may encourage the process by which enterprises become truly global. It may also encourage the strengthening of global institutions. It throws more importance onto the global institutions which do exist, such as multinational enterprises.

As we saw in Chapter 3, country risk arises mainly because of the existence of multiple sovereignties and multiple currencies. The existence of national boundaries is central to the notion of country risk. It is the risk which arises because of the increasing interaction between nation states. Any global activity must take account of country risk. Chapter 6 explores fully the meaning and significance of this concept.

*Industry risk* arises because of the different characteristics of different industries. These characteristics involve different competitive conditions, technologies and ways of satisfying consumer demand. The rate of change of these environmental conditions within different industries also determines the incidence of risk.

*Focus on Theory*

Any enterprise operating on the global scene in specific industries must consider a combination of country and industry risk. It is probably best to picture the risk environment of an enterprise as a risk matrix in which country risk is on one axis and industrial risk on the other. All enterprises are faced with this matrix of risk, shown in Figure 4.3.
The enterprise has no choice but to take account of the higher level types of risk not specific to it which are filtered down and have an impact on its performance. Enterprise risk, however, exists over and above the matrix of risk referred to above. It comprises the issues specific to a particular enterprise, notably its creditworthiness, which in its turn reflects both its economic viability as a profit-making organization over the medium to long term and its ability to remain liquid and crisis-free in the short term. This risk can be further broken down into its different components. A common classification for any enterprise would include the following but this is far from being the only possible classification (Saunders, 2000):

- **Price, specifically interest rate, risk**
  This is the risk of an unexpected change in price, particularly of the price of capital. The latter has a particular importance since it can affect the value of all assets since it changes the basis for capitalization.

  Some price change is anticipated but price risk refers to the non-anticipated change. Price change can be systematic, that is, affect all markets in the same way. On the whole businesses prefer a moderate degree of price inflation, say 2–3%, to any level of deflation or a more significant level of inflation. This is because a moderate rate also inflates nominal profits without disrupting the economic system and diverting investment into particular kinds of inflation-proof assets.

  Risk also arises from individual price movements, again when they are unexpected. It is sometimes possible to anticipate the effect of a change in market conditions, as demand runs ahead of supply or vice versa (see the scenario-building exercise on the price of oil later in this chapter).

- **Differing maturities risk**
  This is the risk which arises because of the different maturities of assets and liabilities held by an organization and combines with unexpected interest rate changes to
create a vulnerability for enterprises. This is particularly true of financial institutions but it applies to any enterprise which has assets and liabilities whose maturity date differs and therefore can only be liquidated at different times.

- **Off-balance sheet risk**
  Not all obligations show up on the balance sheet. Loan guarantees do not, but they create a vulnerability to risk. Enterprises often deliberately create entities which are off-balance sheet to which they shift costs or liabilities from the balance sheet in order to make their profits appear higher and raise their share price. A special case of an off-balance sheet entity is the captive insurance company set up to insure a risk specific to an enterprise. Such an entity is not a genuine controller of risk.

- **Operational risk**
  Breakdowns occur on the operational side, which halt production or threaten the economic viability of the enterprise. There are a variety of sources – labour troubles such as strikes or working to rule, resource scarcities or power cuts. These may arise as a consequence of events completely beyond the control of an enterprise. The cause may also be a fault in engineering systems or a problem of quality control. It is critical to spot such a change quickly.

- **Technical risk**
  The introduction of new technology always brings unforeseen teething problems. It is often much more difficult to bring a new technology on stream than usually thought or planned (see the case study on 3G wireless technology in Chapter 8). In any event, the disruption resulting from the introduction of new systems is a source of risk. The new technology may not initially deliver what is expected.

- **Liquidity risk**
  An enterprise sometimes does not have the cash to meet its immediate obligations, which may have increased above the norm, although in every other sense it is a viable concern. There may be a bunching of demands which cannot be met from working capital or cash reserves available at the time.

- **Insolvency risk**
  The basic cause of insolvency is the inability to make a profit over a significant period of time. It is illegal in most countries for directors of an enterprise to allow it to continue operating if it is insolvent. Enterprises can continue to operate if they can command financial resources. Amazon.com continued to trade without making a profit, and continues to make only a small and uncertain profit. It never became insolvent because it continued to command the necessary financial resources to operate. If an enterprise ceases to be creditworthy and cannot raise new resources, it is in danger of becoming insolvent.

- **Political risk**
  Politics intrudes into the life of an enterprise through policies which impinge directly on almost every feature of its economic life. These policies range from tax changes to changes in the regulatory environment, and from foreign policies to social welfare policies. A change of policy can have a profound effect on an enter-
prise. Policy can change for various reasons. The critical issue is anticipating such a change of policy, which is usually easier to achieve at the domestic rather than international level.

- **Transfer risk**

  Exchange rates change with direct and indirect effects on the revenue and cost streams of an enterprise. There is a translation problem, dealing with the accounting implications of the change in values. There is also a transfer problem, moving funds between countries at exchange rates which are unexpected. There is also an economic problem, which arises from the combined impact of price changes and exchange rate changes. Exchange rate changes are linked, in the medium term, with relative price changes in a complex chain of cause and effect. Both kinds of change need to be considered simultaneously.

Other kinds of risks are referred to in the literature but they are not strictly comparable since they apply at different levels and in different ways. They also overlap in both characteristics and outcomes. They all involve the unexpected happening and a failure to forecast accurately.

Risk-generating events which have an impact at all the levels discussed above can and do occur. There are decision makers of varying importance at all these levels trying to cope with or manage the different kinds of risks. General risk management has to be built at these different levels into each and every strategy adopted by organizations. While there is a trade-off between risk and return, it is clearly in the interest of all decision makers to minimize risk at any given level of return.

**Scenario building**

Scenario building is a technique developed in the nineteenth century by the military for the conduct of war games. The pioneer work in extending the technique to the business world was done during the 1960s and early 1970s by Peter Schwartz at Royal Dutch Shell, with some significant success. As a result it is sometimes called the ‘Shell method’. It has since moved beyond this limited sphere as individual practitioners have moved on from Shell.

Underpinning any reading of the general environment is the aim of generating scenarios which represent different views of the future. This can be done explicitly or implicitly. Most of us do it implicitly all the time. It is better done explicitly so that the strength of assumptions made can be spelt out and tested. The problem is finding the necessary time and resources to do a proper job. It is also often necessary that the full implications of different scenarios are explored.

Any major decision assumes a twin scenario for reading the future:

1. a **goal scenario** expressing the aims and objectives of the individual or enterprise and how they might be realized
2. a **general environment scenario**, specifying the changing nature of the context in which the individual or enterprise seeks to fulfil these goals.
There are therefore both microlevel and macrolevel predictions, those made by individuals in the course of their everyday lives or organizations in the course of their business activities, and those made at higher levels, concerning the unfolding of events at the global or national levels which reflect an expectation of how a host of micro-actions made by others will unfold and interact.

This dichotomy is matched by two very different purposes in scenario building:

1. To assist in making a particular decision. The nature of the decision helps to give scenario building a focus. The process of scenario building has a finite life, corresponding with that of the analysis which precedes the project.

2. As a perception device, one which alerts all the participants in strategy making to future opportunities and threats. This assumes that the process of strategy making should involve as many as possible of an organization’s managers. It encourages all to engage in strategic thinking. This second kind of scenario building is an ongoing process.

Scenario building is best done when an uncertain future presents several discrete and identifiable alternatives. ‘Scenarios are a set of reasonably plausible, but structurally different futures’ (van der Heijden, 1996: 29). It is more difficult if there is a continuous range of possibilities, or if there is complete ambiguity concerning the future, which may be the case if an organization looks too far ahead. In the medium term, complete ambiguity is extremely unlikely. In any event such ambiguity can be removed by the preparatory work done on scenario building. Even a continuous range can be reduced to a finite number of possibilities, with some having markedly higher probabilities than others. The chosen scenarios are initially seen as equally likely to occur. The key issue is the underlying structure of cause and effect which defines the separate outcomes.

Usually it is enough to generate a minimum of two, three or four scenarios from which to select the most likely outcomes, but which also allow decision makers to accommodate other possible scenarios, should they be realized. The number of scenarios will reflect the nature of changes which might occur. There may also be sub-scenarios which are variants of the main scenarios.

The problem with using three scenarios is that two of them will tend to be classified as at the extremes, an optimistic and a pessimistic view of outcomes, and the third, in the middle, seen as the most realistic. The last will inevitably be taken as the scenario most likely to eventuate. It is preferable that the different scenarios represent real differences in the way events might unfold, not some average of possible outcomes, which itself is not really a possible outcome. It is not sensible to exclude extreme outcomes by simply averaging all possibilities. Weighting possible outcomes by their probability produces a similar kind of result, that is, a single forecast, but not a result which is helpful for strategy making. Scenario building is usually set up to avoid an oversimplistic approach to forecasting and take full account of the uncertainty which exists.
There are three main components of a scenario which must be identified and distinguished. The illustrations are from an imaginary scenario-building exercise to forecast the price of oil:

1. **The driving forces**: those factors which ensure that any system changes and then mould the nature of the new system and the way in which it changes. For the determination of oil prices they might be:
   - Environmental concerns requiring the reduction in the consumption of carbon fuels and encouraging energy efficiency and the development of alternative sources of energy
   - Muslim fundamentalism and the nature of international conflict in a post-Cold War world, particularly as it relates to issues relevant to countries in the area of the Persian Gulf, including Israel, and members of OPEC (Organization of Petroleum Exporting Countries)
   - The energy position of both developed and rapidly growing economies, for example the rising dependence of some major oil consumers – USA, Japan, China and India – on imports from the Middle East.

2. **The predetermined elements**: those factors from the past which continue as before, providing stability to any system:
   - The size of existing oil reserves, and the level and rate of growth of potential production in the near future
   - The relationship of energy consumption to economic development as determined by the nature of known technology
   - National and cultural divisions in the world.

3. **The critical uncertainties**: the areas where there are markedly different possibilities but whose influence will determine the nature of the new world (see Schwartz, 1996):
   - The possibility of an ‘oil shock’ of various kinds. This might take the form of a war which closes significant facilities or the overthrow of moderate political regimes in oil-producing countries
   - The exact rate of growth of the world economy over the medium to long term, with the implied level of world activity in ten years time
   - The strength of environmental pressure to reduce carbon fuel use and the level of investment in new technology determining the economics of alternative energy sources
   - The external political environment of OPEC countries
   - The nature of political regimes in OPEC countries such as Saudi Arabia and Iraq
   - The state of the Israeli/Palestinian conflict
   - The productive potential and attitude of non-OPEC oil-producing countries.

There are a number of steps in building a scenario (Schoemaker, 1993; Schwartz, 1996). The following exaggerates the number of steps, but does so in the interests of spelling out exactly what needs to be done. In practice the process can be simplified. It also indicates how this might be done if the aim were to forecast the price of oil.
This involves defining the scope of the exercise, which can vary according to the nature of the problem under analysis. It is helpful to start with a specific problem, or decision to be made, which provides focus and concentrates attention on a limited area of interest. This could take the form of a specific question: should the enterprise make a particular investment? Should it enter a particular market? Should it, as part of a policy of diversification, acquire an enterprise in a quest to enter a new industry? The problem to resolve might be whether to open a new oil or gas field and undertake the enormous investment required.

It is possible to examine the scope. Is it a big problem with macro-implications? Or is it a micro-problem with restricted links to the macro-scene? In the former case there are broad questions to be asked. They may not be simply economic. In the latter it may be that the problem is more circumscribed and limited to economic or business issues. For example, for the price of oil, the interest might be:

- A broad one, that of a government considering the implications of oil import dependence at different price levels, particularly if it concerns an unstable region.
- A narrow one, that of an oil company wishing to open up a new oilfield, asking the question whether it should do so. The decision might hinge upon the level of the price of oil. Or an automobile producer planning a new car, where the type of car, with its power source, its planned size and engine capacity, might depend on the price of oil (see the case study on the HEV in Chapter 5).

Focus on Theory

Macroeconomic stability is usually understood in the context of the movement of aggregate prices. Those who have grown up in the postwar world have lived all their lives in a scenario of persistently rising prices or inflation. This has not always been the normal condition. Throughout history there have been significant interludes of falling prices, not just brief adjustments after wars or other events (for the regularity of such cycles see Fischer, 1996). From 1873 to 1896 the general price level fell consistently, and it did so again in the 1930s. Today prices are falling in a number of significant Asian economies, notably in Japan and China. There is some concern that the world is about to enter a new interlude of falling prices.

Falling prices create a much more difficult scenario for most decision makers than rising prices, particularly if there is a high level of debt in an economy. The real value of debt rises in a situation of fixed nominal debt value and falling price and income levels. However, if the fall in incomes lags behind the fall in prices, consumers benefit.

There are two factors which might cause deflation:

1. A tendency of potential output to run ahead of actual output and create an output gap. Excess capacity is really a symptom of the problem since it is in theory possible to lift demand to the appropriate level. The 1870s' deflation was associated with the massive surge in agricultural and commodity output which resulted from the opening up of new areas of settlement in the world. The primary sector led the way. Today the excess output is much more likely to be in manufactured goods, automobiles for example. If output grows at less than its potential rate of 3–3.5%, surplus capacity will appear and grow, especially if the disparity persists for a number of years. The growth of the Japanese economy has limped behind its potential to produce manufactured goods, as a result of a
This involves identifying the key players and driving forces in the environment immediate to the problem. This requires knowing who the main stakeholders are since they will define what is meant by success and eventually indicate whether success has been achieved. What exactly would indicate success for them? Very often profit is the key performance indicator. What factors influence whether success is achieved for players other than the owners? Who is likely to be affected by the success indicators?

The interests and actions of the main stakeholders are a vital part of the exercise since their responses to ongoing events will help to determine the actual outcomes. Some players may not be stakeholders in the narrow sense of the word. Their actions may be unconnected with the problem area. The forces which affect all groups may differ widely, including everything from changes in government policy to immediate environmental concerns.

In the case of oil, the main stakeholders are the governments, the owners of the enterprises which produce and use oil or produce and sell products complementary to oil or oil-using products, and those who manage or work in such enterprises:

- For the governments of oil-producing countries, revenue from excise taxes or directly from oil sales is the main success indicator. It depends upon both price and quantity sold.
- For the government of an oil-importing country, it might be to keep the cost of such imports at a manageable level.
- For an oil company or an automobile producer, profit is the main performance indicator. In the first case, the price has a direct impact on profitability, in the second an indirect impact, since the demand for automobiles and their use when purchased will reflect to some degree the running costs of cars, including the cost of the petrol consumed.
This involves identifying in a general way the three factors which influence outcomes: the driving forces which underpin the motivation and actions of the key local players; the predetermined elements which provide stability; and the critical uncertainties whose unfolding underpins the existence of markedly different scenarios. The predetermined elements will be the same for all the scenarios. What distinguishes one scenario from another are the critical uncertainties.

This step requires identifying the basic trends which are relevant to the area under analysis, specifically the macro-driving forces operating in and on that industry. It is breaks in trends, or large unexpected events, with which it is most difficult to deal. Are there technical changes which are revolutionizing the methods and costs of production or the use of the product or service? Are there demographic changes which are changing the nature of demand? There is a need to link these in a theoretical way to performance indicators which are important to the enterprise.

Probably the chief driving force in the oil industry is the behaviour of OPEC. The conditions of supply and demand remain stable over time. Most oil production in any period comes from existing fields. Reserves are well known. Equally, in the short term, demand is relatively fixed, except that the level of activity in the world economy determines the overall level of demand, which fluctuates with the business cycle. The overall supply and demand conditions create the environment in which OPEC seeks to set the price. In normal circumstances OPEC seeks to fix the price at between $18 and $24 per barrel. There are four critical uncertainties:

1. the general political environment
2. how far OPEC remains united and reacts in a concerted way to changes in that environment
3. how non-OPEC countries behave in response to OPEC initiatives
4. how much of world production OPEC controls.

The fourth step is to focus on the identity of the key uncertainties and investigate the levels of uncertainty associated with them. This involves identifying the areas of critical importance which have a significant impact on outcomes, but where it is uncertain what might happen. Is government policy a critical variable, or is technical change more important?

For example, in the oil industry it needs to be asked whether OPEC will limit production in the interests of higher prices. Or will production in countries outside OPEC increase in a way which undermines OPEC’s ability to control prices? Or is it the overall increase in the level of demand for oil, which reflects the rate of growth of the global economy, that dominates, rather than supply factors?

What determines the behaviour of OPEC? What are the influences beyond the narrowly economic? The political situation in the world, in particular in the Middle East is a major factor in this, as the price hikes of the 1970s showed. The state of the Israeli/Palestinian confrontation, the role of Iraq and its stance vis-à-vis the outside world, Islamic fundamentalism and its popularity, the nature of the regimes in Iran and other oil-producing countries are all key issues.

How homogeneous is OPEC? Equally, how far can OPEC persuade non-OPEC coun-
tries to go along with it? Specifically, what are the policies of countries such as Russia, the former Soviet republics, Norway and Mexico which are possibly important sources of new reserves of oil and significant reserves of gas that are competitive with oil?

This involves a first drafting of possible scenarios since the main themes, or scenario drivers, have been identified. There should emerge a clear logic for each scenario, a sequence of causes and effects. If, for example, there are two key variables, these could be presented as a matrix which offers four possible scenarios. The price of oil which determines whether a new field is economic to develop may reflect the price and production policy of OPEC and the supply of oil outside OPEC. At this stage the scenarios take a crude form but the main variables are all put into place.

The scenarios involve the choice of a plot or narrative story, of which there are a number of different kinds. It might be one in which there are winners and losers – a zero-sum game – or it may involve a particular challenge and response or simply be part of a process of evolution of an industry or market. The scenario may reflect the nature of that narrative story.

A preliminary outline of the oil scenarios might develop three possible outcomes from the unfolding of the element(s) of critical uncertainty:

1. At one extreme, it might assume a resolution of the Israel/Palestine problem and the prevalence of moderate Arab governments in charge of the oil-exporting countries, with a decline in the influence of extreme views. It would also assume a resolution of the problems in Iraq.
2. At the other extreme, there is the continuation of major conflict, and the domination of fundamentalist governments prepared to use their oil muscle to reduce output and push up the price of oil as a political weapon.
3. In between these two extremes, there is the continuation of the present uncertainty, with unresolved conflicts and a mixture of moderate and fundamentalist regimes. This regime may be an uneasy one, punctuated by intermittent crises. In this case there are occasional events which threaten to destabilize the situation.

These possibilities give us the basis for three scenarios, which represent three feasible futures:

1. A relatively low oil price of $10 per barrel
2. A price at the high end of $30
3. A medium price of $20 which is close to the level before the Iraq War of 2003.

The sixth step is to check the scenarios for consistency and plausibility. At this stage this is not a full reality check, more a check of the internal logic or coherence of the narrative story, and a cursory evaluation of the persuasiveness of the scenario constructs. Do they look and feel right?

At the same time it is possible to develop them into what can be called learning scenarios, in other words, to try to give expressive titles to the relevant scenarios, titles...
It is possible to label the oil price scenarios to give them some focus. The first could be called *peace reigns*, the second, *clash of cultures* and the third, *continuing instability*.

The peace reigns scenario means that political intervention in the market determination of price is mild and the price simply fluctuates within the desired range according to market conditions. If there is significant growth in the developed economies, the price may be relatively high, at around $24; if these economies are in recession, the price may be at the lower end, at about $18. Even in this scenario, if OPEC loses its control over price as new producers enter the market, or as members become free riders maximizing their own advantage by increasing production and hoping that price stays up, prices could drop to $10 per barrel, particularly if the world economy is in recession.

The clash of cultures scenario means that production will be badly and significantly affected by damage to wells, deliberate curtailment of production or embargoes and sanctions from outside. Depending on who was affected and by how much, and how far producers outside the area could compensate for lost production and hoping that price stays up, prices could rise to $30 and above, in some cases well above, even to a level of $50.

The continuing instability scenario is the most difficult to interpret. Within this scenario, there might be a whole range of possible prices, from $10 to $30, possibly all these prices at different times. It depends on the exact mix of economic conditions, the strength of OPEC, the share of oil production accounted for by OPEC and the nature of the political environment at the time.

This comprises fleshing out the scenarios, including the gathering of detailed information which can be fed into the analysis as the basis for the different scenarios, broadly through the process of scanning and monitoring described earlier. On the
basis of the previous analysis, research needs can be identified and action taken to find the information, if it is not readily available.

This step might include the application of quantitative techniques, including modelling where appropriate. The key issue is to use quantitative techniques as a servant, not to allow them to become the master, and avoid giving the analysis a spurious degree of accuracy. In most cases this will result in the construction of a number of possible narratives, showing how the economy moves from point A to point B, point C or point D.

This stage involves developing a narrative of how, in each oil price scenario, the political situation will develop and how OPEC will respond to this situation. This needs to be done at different levels, both at the global political and economic level and at the level of the oil producers themselves. This is a major task. For example, it requires an analysis of the stability of key regimes such as Saudi Arabia and Iraq.

This involves the drawing out of the implications of the scenarios. How do they look in terms of the decision being made? Does the identity of a realistic scenario make a difference to a project decision? Under how many and which scenarios should the decision be made? Part of the analysis is to assess the impact of these scenarios on the performance indicators of the enterprise. If only one scenario indicates success and this is an unlikely outcome, then the decision is obviously a risky one. If one or more scenarios give a result which is not as positive as might be desired, then it might be worthwhile to see how the result could be improved under the relevant scenarios. Such work enables more robust results to be derived. This allows the analysis to evolve towards clear recommendations on making particular decisions.

The number of realistic scenarios may differ according to the nature of the balance between the different elements. Different probabilities could be attached to these scenarios but it is better to assume equal probability. It is important not to exclude consideration of all scenarios but the most probable. The key issues are the causal mechanisms which explain the unfolding of the different scenarios, not some artificial estimate of probabilities.

At this stage it is necessary to start to draw out the implications of the scenarios for the decisions. Are the outcomes sufficiently different to make a difference to any decisions to be made, whether by governments or private enterprises? Are there ways of making a strategic decision more compatible with all scenarios?

The final step is to identify some leading indicators which are easy to monitor and can tell us which scenario is being realized. These are sometimes called signposts. The greater the logical coherence built into the scenarios, the easier it is to draw out such leading indicators or signposts and check whether what actually happens conforms to the expectations built into the different scenarios. Where is the world actually headed?

Oil prices move continuously from day to day but may not be the best means of tracing the unfolding of the actual scenario (Figures 4.4, 4.5 and 4.6 show the effect of different behavioural assumptions on the price of oil). Political events in combination with economic trends may be more helpful. There may be a combination of signposts, such as the rate of growth of world output, the proportion of world reserves within OPEC countries compared to the proportion of output accounted for by OPEC and the level of income per head in the oil-producing countries.
Scenario building is not something to be engaged in as a brief supplement to other activities or as one of a number of ways of confirming what has already been decided. It is a significant aid to decision making and an essential part of strategy making. It can even be elevated as part of the strategic culture of an organization, as with Royal Dutch Shell.

The construction of relevant scenarios requires careful preparation and considerable research; it inevitably absorbs significant resources and is not to be undertaken lightly.

When should scenario building be used? Generally the level of uncertainty increases the further an organization looks into the future. This uncertainty usually diminishes as the time perspective shortens and approaches the short term. In the medium term, scenario building is very useful. However, since the degree of uncertainty varies from industry to industry, or from sector to sector, the exact length of the medium-term scenario differs.

There are a number of situations when the use of scenario building becomes valuable, even critical to an enterprise:

- The general or industrial environments are ones in which there is a high level of uncertainty
- There have already been a number of costly surprises in the industry which have caught out the enterprise and had a significantly negative impact on its performance
- The industry is a new one and/or one which is subject to major change.

Therefore, for various reasons, past experience already suggests turbulence and the future offers the likelihood of more. It is sometimes argued that scenario building is a defensive rather than an offensive exercise, that is, it is more threat- than opportunity-focused. This need not, and should not, be the case. Other more positive reasons for pursuing scenario building are:

- Competitors are already using the technique, and using it effectively
- The enterprise is bad at recognizing opportunities and has failed to exploit opportunities which other enterprises have used to create competitive advantage. The failure may result from group thinking, a conservative view which restricts the diversity of ideas, acting as a straitjacket on creative thinking and/or excessive fragmentation, with each individual doing their own thing and no consensus existing.

The key is to achieve an appropriate balance between integration and differentiation, so that there is enough creativity to identify opportunities and enough harmony to draw out the implications of these opportunities. Scenario building may be the means of achieving this. The failure by the organization to use scenario building may reflect an inability to engage in strategic thinking at any level of the enterprise. By providing a common language and framework to look at the future, the use of scenario building will help in adopting a strategic perspective. Scenario building will help to highlight and resolve existing differences of opinion concerning the future which, in a sector undergoing major change, may be significant. For that reason it is a precondition for good strategy making.
This is a construct of the economist. A demand curve is drawn for a given moment in time. It represents the level of demand for a particular product at different price levels, assuming that it is known. A comparison of different points on the curve does not represent change over time. Change over time is shown by comparison with a new curve. A demand curve can be drawn for a whole market or an individual; the former is an aggregation of the demand curves for the latter.

A well-behaved demand curve is one which shows consistently higher levels of demand at lower and lower prices; it is consistently downward sloping. The relationship between a change in price and a change in quantity demanded is referred to as the price elasticity of demand (% change in quantity demanded divided by the % change in price). Demand is said to be elastic if the ratio is greater than one, inelastic if less than one. Elasticity is sometimes represented as the slope of the demand curve – the steeper the slope, the more inelastic the demand.

Price determination
The price of a product is determined by the intersection of a demand and a supply curve for that product. These curves trace out the quantity of the product demanded or supplied at different price levels. It is assumed that well-behaved curves fall in the case of the demand curve and rise in the case of the supply curve, so that there is always an equilibrium price which equates demand and supply. The stability of the equilibrium price, that is, the ability of the market to return to that level, depends on the exact slope of the curves.

Change over time would be represented by shifts in the curves. For example, the situation for oil might be as follows. As world demand increases with world output, the demand curve shifts upwards. The rate of shift is likely to reflect the rate of substitution of other sources of energy for oil. As new sources of supply are found, this tends to push outwards the supply curve, but it can be countered by using up existing reserves.
Focus on Theory
cont’d

In an extreme case, the demand curve may move upwards and outwards and the supply curve downwards, increasing the equilibrium price of oil. If OPEC totally dominated supply, then it could either fix the price and supply as much oil as is demanded at that price or it could fix the quantity and allow demand to fix the price. In the first case, the supply curve is horizontal at the given price, that is, infinitely elastic with respect to price. In the second case, the supply curve is vertical at the given quantity, that is, has zero elasticity with respect to price. The former better represents the behaviour of OPEC. If the non-OPEC producers are willing to sell at a lower price than OPEC, the supply curve will be well-behaved up to the point at which the OPEC price cuts in. It is possible that OPEC policy may change from one position to the other in an unpredictable way.

Figure 4.6 Price determination under different conditions

Nature of the industry

The industry which builds airliners has a number of special features which are relevant to the case study:

1. Fixed costs are a large part of the total costs for the production of any airliner. The R&D costs of a new airplane are high, reaching billions of dollars. In order to cover these costs, a manufacturer has to sell a large number of planes, internationally as well as domestically. A generation of airliners must have a long life in order to allow production to cover fixed costs. The present generation is 20–30 years old. To break even on a new airplane requires sales of 400–500 planes, at a rate of about 50 a year over a 10-year period.

   Because of the complexity of aircraft production, there is also a very significant process of learning how to produce new aircraft efficiently. An experience curve typically shows a reduction in costs of 20% for every doubling of production.

2. These two characteristics – economies of scale in the spread of development costs and significant economies of learning – partly explain why the industry is currently a duopoly, one which could easily become a monopoly if one of the players makes a serious mistake, although it seems likely that the relevant governments would step in to rescue the company in trouble. It also explains why government intervention has been important in this industry.

3. An airliner is an expensive and highly complex product – its manufacture involves thousands of different components. Major employment opportunities and income streams are generated in the region in which production is located. The manufacturer is faced with a proliferation of make-or-buy decisions.

   The industry resembles a pyramid, in that there are a few mainframe integrators at the top, dozens of primary subcontractors in the middle and thousands of secondary subcontractors at the base. Subcontracting, which accounted for less than 10% of operations in the 1930s, rose to 30–40% in the 1950s and to 60–70% by the 1970s. Only those processes which are critical to the core competencies basic to the manufacture of an aircraft have been retained. Others which are not critical are outsourced to those with the relevant core competency. This is partly in order
to reduce cost and create flexibility, and partly to raise the quality of components. It is also a method of risk sharing. The component producers share the cost of failure. Sometimes there is a desire to share design and production work with firms located in the countries of purchase of the airliners, so as to be better able to sell the airliners to the local airlines.

4. Because of this complexity and the associated costs, new aircraft are not stand-alone products, but members of extended families of related planes which will share many components and procedures for use in their operation.

5. The demand for new airliners reflects market conditions in the airline industry. These can be quite volatile in the short run and have become increasingly so over the last 20 years, so that demand can fluctuate dramatically from year to year.

   In a downturn airlines have surplus planes. In the recession at the beginning of the 1990s, this reached just below 10% of all planes in operation, in the present recession it is as high as 15%. As a consequence airlines slow the rate of new orders and try to delay the delivery of planes already ordered. Even those planes which are ordered and delivered often have to be financed with the help of the manufacturing company which becomes a banker to the airline. The revenue impact of such events on airliner manufacturers is to restrict the money available for new projects.

The past

Initially Airbus aimed for market niches which were free of major competition. It started with just one model of a plane which it designed and built over a seven-year period beginning in 1967. In 1970 the A300 made its maiden flight. The standard A300 carried 226 passengers in two classes. It was built for the short- to medium-range European market. It was the first twin-aisle, twin-engine airliner. It first saw airline service in 1974. By the end of 1975 Airbus had captured 10% of the market segment. Eastern Airlines was the first American airline to use the A300, leasing four aircraft and then confirming an order in 1979. This purchase represented a decisive coming of age for Airbus.

   The Airbus strategy was very similar to that of Boeing – to innovate technically, continuously cut costs and develop a whole family of related aircraft. If anything it attached even more importance to its own profits and the operating costs of customer airlines. From the initial one model, Airbus developed a family of 15 different airliners, from short- to ultra-long-haul planes. It now produces a plane for every market segment.

The key events in the history of the A300 series were: the introduction of the A320 in 1988, the first fly-by-wire system (fully electronic control of rudder, flaps and all key mechanisms), a system then extended to the whole family of planes; the introduction of the A340 in 1993, the first new four-engine, long-haul airliner in the world for 20 years; and the announcement of the launching of the A380 programme in December 2000, planned to make its maiden flight towards the end of 2004. The A380 is the focus for this case study.

   Airbus has grown into a fully mature company, a manufacturer of civil airliners for the global market. In 2000, its total turnover was US$17.2 billion. By the end of June 2001, it had 4.300 orders outstanding. It was turning out a new plane every working day. As of 2002, 2,500 Airbus aircraft were in service, with 186 different operators in all regions of the world.

   From the beginning there was a clear demarcation of responsibility for different functions in building the airliners, although competition for orders was encouraged. The different national parts of the consortium specialized in different areas. In Toulouse, there are 3,000 people from 25 countries working together. Transnational working patterns are very important to Airbus, indeed critical to its success.

The future

The launch by Airbus of the A380 represents a bold coming of age. The standard new plane, it is planned, will seat 555 passengers and is being designed with stretched versions in mind. The A380-200 is planned to have 656 seats. A fully stretched version could carry as many as 800 people.

   The range of the A380 is designed to be 10–15% longer and its operating costs 15–20% less than current planes. These are significant gains and likely to be the source of a pronounced competitive advantage for the airlines who operate the plane, if they can be achieved and if no competitor betters them in the meantime. The plane is also intended to be very environmentally friendly, with low fuel burn, less noise and a smaller injection of pollutants into the atmosphere.

   The project represents a major challenge to Airbus, both technically and managerially. It requires the application of state-of-the-art technology, using new materials, such as carbon composite for the ‘wing box’ which joins the wings to the fuselage. As much as 45% of the plane will be constructed from such materials. Fortunately Airbus has been a leading pioneer in the use of carbon fibre over the last 20 years. The managerial challenge is as great, since it is the first project undertaken by the new integrated company. Airbus will need
to become leaner and more commercial in its working practices in order to keep the price down and keep to the timetable proposed.

The aircraft has already proved to be popular with the airlines, with orders at a high level. The first planes are due to be delivered in 2006. Airbus’s record of achievement leads most airlines to take at face value the timetable which Airbus has proposed for the new project, although some specialists expect a stretching by one year of that timetable. If it comes into existence, no significant airline operating the long-haul routes can afford to be without the new mega-liner. Many are hedging their bets and establishing their place in the queue by ordering now.

**Competition**

This is an industry in which there are major barriers to entry. It is unlikely that in the near future there will be a new entrant into the industry. This could only occur in the distant future with major government backing combined with the support of a captive market. The main barrier is the sheer size of the cost of developing a new airliner and the long period of time taken to develop a full suite of planes which can compete in every market niche. It has taken Airbus 30 years to become competitive with Boeing. Both the cost and time needed are increasing. The development of the A380 is likely to cost as much as US$12 billion.

Airbus has been assisted in its rise by a considerable degree of complacency on the part of Boeing, resulting from its previous success, a self-satisfaction which constitutes the greatest threat to a continuing competitive advantage for any enterprise. The culture of Boeing was one traditionally dominated by engineers, which did not encourage mention of profit. When Harry Stonecipher took over the day-to-day running of Boeing, after its merger with McDonnell-Douglas, he is reported as being horrified by the state in which he found the civil airliner business. Boeing, clearly losing the competitive battle with Airbus, had entered into a self-destructive price war in order to try to block the rise of the new manufacturer. Production planning was so disorganized that the production lines had to be stopped in the autumn of 1997 in order to allow the suppliers of components to catch up with the level of existing demand.

Airbus and Boeing compete head on for every airline purchase. This is a comparatively recent phenomenon. Of the aircraft currently in the air, Boeing has provided 65% and Airbus 33%. Other players are bit players. More recently, Airbus has been winning the competition, so the proportions in the air are changing. In 1999 Airbus won 470 compared with Boeing’s 391 new orders, that is, 55% of the market. For the first half of 2003, Airbus was winning orders at a rate more than five times that of Boeing. It is outcompeting Boeing in every aircraft type. Already Airbus has orders from 10 airlines for 124 of the A380 passenger jets, the largest being for 45 from Emirates. Qantas put in a significant order. Boeing is yet to solicit orders for a new plane; it is at a much less advanced stage in the development of a comparable project.

However, Boeing is less dependent on this industry than Airbus, and is in the process of becoming even less dependent. It always has the option of exit and is taking action which could facilitate such an exit. Boeing has considerable military and space interests. It is one of the largest players in this area, a market much more stable and consistently profitable than that for civil airliners, largely because of government involvement. Boeing has begun to develop an interest in aircraft services – air traffic management through satellites (potentially a greater revenue raiser than civil jets), broadband communications and financing through Boeing Capital, a route which General Electric took when Stonecipher headed its engine division.

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**Focus on Theory**

**First-mover advantage**

In certain circumstances there is an enormous advantage to being the first mover. It is useful to construct a numerical example for the A380 to show the potency of the cost factor for a first mover. The total development cost of the new aircraft is $12 billion which has to be recouped by sales of the aircraft. If the sales are 100 then the fixed costs per aircraft are $120 million for each plane. If the variable costs are $100 million per plane when 100 are built, probably conservative for such a pioneering aircraft, then the total cost of a plane will be $220 million. If the sales are 200, then the fixed costs fall to $60 million and the total cost to $160 million. If the sales rise to 300 then the fixed costs fall to $40 million and the total costs are $140 million. In the unlikely event that production rises as high as 400, fixed costs per plane fall as low as $30 million and total costs $130 million.
Introducing Strategic Management

Strategic issues

Strategic risk

In a duopoly any strategy must be formulated with the strategy of the other duopolist in mind. Each is seeking to gain a clear competitive advantage, trying to deter the other from a strategy which would give that player a competitive advantage. In such circumstances there is always the possibility of cooperation but also the possibility of opportunism and deception. This is very much a prisoner’s dilemma situation (see Chapter 13).

The decision by Airbus to develop a new super jumbo aircraft which will hold more than 500 passengers is bound to have an impact on Boeing. Boeing, which would have preferred to stay with its existing 747-400, which carried up to 414 passengers, was forced to respond. Initially it responded with a plan for an extended 747, the 747X. Boeing pioneered the habit of stretching basic planes. In this case the 747 would be stretched to 550 seats, with improved wing aerodynamics and fly-by-wire technology. Such a project, if implemented, would cost it only one-quarter to one-third the cost of the A380 project. However, it soon realized that this was not enough. Boeing had become excessively cautious, whereas before it had kept ahead of the field by being the pioneer. It tried to leapfrog ahead of Airbus by making public a much more advanced project. It responded with the sonic cruiser, in essence a revival of an old supersonic project. However, this project never really took off, and the focus is now on the Dreamliner, a more efficient mid-sized aircraft.

History has shown the problem of launching similar planes simultaneously in a limited market. Lockheed and McDonnell-Douglas launched the L-1011 and the DC10 into a market which could only accommodate one such plane and also failed to compete with the existing

Focus on Theory cont’d

There is no allowance made in this estimate for the effect of experience, or learning by doing, on variable costs. A doubling of production would reduce the variable costs by 20%, which means that costs come down to $80 million for production of 200 and just over $60 million for production of 400. The total costs then decline from $220 million per plane, at a production run of 100, to $140 million at a production run of 200 and to just over $90 million for a production run of 400.

The other important issue is how much an airline is prepared to pay for the aircraft. It is not unrealistic to assume a list price of $150 million per plane. Planes are typically sold on a considerable discount on list price, particularly in a recession. This means a loss of $70 million per plane at a run of 100, a profit of just $10 million per plane at 200 and a significant profit of $60 million per plane at 400. This ignores the timing of costs, mostly incurred early, very early for fixed costs, and revenue, mostly flowing late in the project, as much as five, ten or even twenty years after completion of development. On any reasonable calculation of present value (at a discount rate of 5%) this would mean that at 200 aircraft produced there is still a significant loss. Allowance for a reasonable risk premium in the discount rate ups the ante. The breakeven point may be as high as 250 planes, more realistically 300. Beyond this point the manufacturer begins to make real profits.

Also of relevance is the size of the market. This may vary according to the price, but it is possible to assume away the problem of the price elasticity of demand. If the market were 1,500 as Airbus anticipates, on the most optimistic assumptions this would allow as many as six producers to break even. If the market were only 500, as Boeing anticipates, on the same assumptions, there is room for only two manufacturers. However, no self-respecting manufacturer could be happy with sales below 300. This means either five possible manufacturer slots on the Airbus forecast or just one on the Boeing. Competition really hots up with the latter situation. It will pay to get in first and sell as many aircraft as possible.

Since all the estimates are rather conservative, the situation is even more stark than it appears. There are very real first-mover advantages.
The Boeing 747. The DC10 exited in 1980 and L1011 in 1981. Both failed to cover the development costs. The result was mutual suicide and the extinction of both manufacturers as separate entities.

Airbus has become the leader and Boeing the follower. For a short period, during 1993–5, there was a temporary cooperation between the two on the very large commercial transport project. The Airbus managers believed that this might have been a ploy to try to extend Boeing’s dominance which was under threat throughout the 1990s.

The managers of Airbus rightly thought that the sonic cruiser was a bluff, but have admitted that they have a trans-sonic project code-named E2 under analysis. For example, one of the artist impressions of a sonic cruiser for a period adorned a billboard just outside the Qantas Jet Base at Sydney Airport. It read, ‘Let the Future Begin’, and was pitched at eyeball height, not for motorists, but for the Qantas team working in nearby buildings on the introduction of the Airbus A380, for which Qantas had made a very significant order. It was removed when it became obvious that the project was a non-starter with very little airline interest.

The sonic cruiser was intended to fly at just below the speed of sound, about Mach 0.98, slower than Concorde but faster than Boeing’s existing jets, thereby reducing significantly air time on long routes, for example by two hours on the Sydney–Los Angeles flight. Future members of the family would fly even faster, at Mach 1.08. In a positioning statement, Walt Gillette, the vice-president of the sonic cruiser programme, said that it would be a family of jets, the first carrying 250 passengers between 10,000 and 16,000 kilometres non-stop. One problem for Boeing was that the first plane would not be likely to be in service until 2008, two years after the A380. Even this was doubtful since the technology was new, with at least 60% of the plane made of composite material, and completely new engines required. There is also on the Boeing drawing board an even more revolutionary plane, a ‘blended-wing-body’ aircraft which is ten years into the future.

The Boeing approach may be bluff, but it is consistent with the history of the company. The company originally designed the 747 as a military aircraft but it lost the tender. It therefore conceived the aircraft as a freighter which explains its blunt front. For Boeing the jumbo was simply a stopgap to fill a transitional period until supersonic flight became the norm for mainstream long-haul flying, already pioneered over the last 20 or more years by the Europeans with Concorde. The jumbo was a stopgap which surprised the world, saturating it, with 1,300 so far sold, at a total sales value of US$200 billion. There are still about three jumbos rolling off the production line each month. Whatever happens at the top end of airliner competition there will still be a mighty struggle at the lower end and in the middle ground between the Boeing 737 and the Airbus A320, and between the Boeing 777 and the Airbus A330 and A340.

**Anticipating the future**

Airbus and Boeing have adopted different strategies which can be summarized briefly as scale versus speed. The two companies have read the future market differently. Boeing thinks that most future passenger growth will come from frequent point-to-point flights, rather than longer flights between the hubs, or major airports. Airbus thinks the opposite.

Accurate forecasting is an essential precondition for the successful launch of a new airliner. Both Boeing and Airbus have their own econometric models of the future demand for airlines, models which they improve and update each year. These models are a critical part of the justification for any project. An ability to anticipate the future accurately is critical to the development of strategies which work (see Chapter 5). The further into the future goes the prediction, the more room there is for disagreement. The forecasters in Toulouse and Seattle differ significantly in their vision of the market 20 years into the future.

The two manufacturers agree on two issues. They agree that growth for the services of airlines, both for passengers and freight, will grow at about 5% per annum over the next 20 years. This will be translated into a threefold increase in the number of planes over the next 20 years. They also agree that there will be a market for some mega-liners, jets which will carry more passengers than any previous airliner, 500 passengers and above.

Where they differ is on how many large airliners are needed. Boeing anticipates a demand for more than 18,000 new planes, of which one-third will be twin-aisled, that is, large. Airbus sees the demand as 20% less, a little more than 14,500, but with almost half twin-aisled. This translates into a significant divergence of view. Airbus believes that there will be a market of 1,500, 1,200 mega-liners and 300 freighters. Boeing thinks the market will be as small as 500, 330 passenger liners and 170 freighters. This is a large difference and has a powerful influence on the strategy adopted by the two manufacturers. The former prediction is much more friendly to a project for developing a mega-airliner.

There are other assumptions which feed into this divergence of forecast. Boeing believes that there will be more deregulation of the skies than Airbus does. Airbus thinks that the influence of this on patterns of passen-
Ger flow will be countered by the capacity constraints at airports which will require the arrival of fewer, and therefore larger, planes.

**Future strategy**

Given the different views of the future held by each, what strategy will these players choose to pursue? The strategy depends on three main factors:

1. The exact size of the future market or, more accurately, the view of the size of market taken by the manufacturer, in particular whether the market is big enough for two players or just one, or optimistically more than two.
2. The confidence with which the manufacturer might embark on a project which will make significant new demands. That confidence reflects a combination of factors, including:
   - present market share and the ability to translate that into orders for a new airliner
   - technical expertise and the capability of mastering all the problems involved in creating a new generation of airliners
   - access to the financial resources needed to make the project a success.
3. The abilities of the leaders of the airline to formulate and implement an appropriate strategy. Any self-doubts will probably yield a strategy which tries to avoid commitment to a new project, or a significant delay in its inception. A high risk level might also lead to a strategy of diversification away from reliance on civil airlines, an option which is ignored for the moment.

Airbus has already won more than 100 orders for the A380, enough to keep the production line going from 2006 to 2009. There is every prospect of Airbus reaching the putative breakeven point of 230 planes in the relatively near future. At this stage it appears unlikely that Airbus will withdraw, although the project could be delayed.

There are a number of possible strategies to be adopted by the two players. Assume that the demand for planes is only sufficient to support one project, not both. The aim of each would be to become the only supplier:

- Both try to bluff each other out of the game. A possible outcome is that one goes ahead, after succeeding in bluffing the other whose bluff fails.

One airline could decide not to go ahead with the project, even if it has already been publicly announced. It is faced with the problem of dissuading the other player from going ahead. If the other does continue with a rival project, it could establish a competitive advantage in the operational effectiveness of the new plane which could take years to emulate; it would have considerable first-mover advantage. This may mean each player trying to give the other the impression that its new project is still going ahead, come what may, in other words bluffing. The two might then compete in the ambitiousness of the projects announced in the hope of intimidating the other.

- Both agree to delay the development of the new generation because demand is inadequate and the manufacturers lack the resources to complete the projects.

One resolution of the situation described above is that the two airlines get together and agree not to introduce a new generation of planes, or at least to delay the inception until they could be certain of a large enough market to accommodate both. The present uncertainty of demand for air travel resulting from the danger of terrorist attack, ‘the constant shock syndrome’, encourages such an approach. It may be obvious that, should both go ahead, the sonic cruiser might cream off enough business traffic to make the A380 unprofitable while not justifying its existence.

- Both go ahead in conditions of healthy demand but they target different market niches.

If there is enough demand to justify the completion of both projects, the scenario above might still be repeated since profits would be significantly higher for a sole player who completes the project. On the other hand, the game may be played openly and possibly evenly, if both projects have their counterbalancing strengths and weaknesses, which make the relevant planes appropriate to different market segments.

What of other key players, including stakeholder groups? The two manufacturers are not the only players.

**Customers**

A key question, particularly apt in the difficult environment of post-September 11, is how many airlines can afford to buy the new aircraft. The airline customers are very important. Without their orders no project can go ahead. Has September 11 permanently changed the nature of the market or reinforced changes which were already underway? This is unlikely.

**Suppliers**

Suppliers of components, such as the engines, are also important. They have to be involved from an early date in the development of a new airliner. They will help determine its price. Contracts for supplies are often used to help win orders from the local airlines. For example,
Airbus has awarded contracts worth US$3 billion over 20 years to 15 different Japanese suppliers, including Bridgestone for the tyres, in an effort to persuade the Japanese airlines to place orders for the A380.

**Government**
Also important is the government or rather the governments which fix the regulations which determine the structure of supply in the airline industry over the next few decades. It does matter to the manufacturers whether in 10 years there are many small airlines or simply a few consolidated and very much larger airlines. The latter would be likely to have the resources to buy mega-liners whereas the former might not.

Boeing seems keen to adopt a strategy in which it avoids direct confrontation with Airbus by putting the emphasis on a strategy which diversifies its interests. This may suggest to Airbus that Boeing is not serious about its proposals for the next generation of airliners. It is dangerously overreliant on the 737 and to a lesser extent on the 777, with the 757, 767, 717 and 747 having very few orders. Purchase of McDonnell-Douglas raised Boeing’s profile in military and space, assumed to be a more stable source of revenues, one less subject to the cycles of the airliner business. In 2003 for the first time defence overtook commercial aviation as a source of revenue. Boeing is seeking to become the ‘systems integrator’ for high-profile defence contracts. One example is the US$16 billion contract to lease 100 new 767 air-fuelling tankers to the US Air Force. Boeing’s leaders have also noted the success of IBM in turning from manufacturing to supplying services. Maintenance is an obvious service which is profitable, but one which reflects the number of planes already sold. Success in providing an air traffic control system based on its satellite system would establish a significant alternative source of revenue. The financing of aircraft purchase by Boeing Capital is another area ripe for expansion, but again might be strongly linked with aircraft sales. Insofar as Boeing ceases to be dependent on aircraft sales for most of its revenue and profit, the nature of the strategic context for its rival also changes.

The element of strategic risk for both companies is high. Once a decision is made to initiate a new project, and Airbus seems to be fully committed to the A380 project, then every move has to be closely planned, whether it relates to production, finance or marketing. Airbus must ensure that:

- all suppliers are properly prepared
- every sale is won and sustained, even in recessions.

The main features of the timetable of the project have little flexibility once a commitment is made.

**Case Study Questions**

1. Why has the industry manufacturing civil aircraft become a duopoly?
2. What would be the influence on both the manufacture and the operation of civil airliners if one manufacturer was to cease production and the industry was to become a monopoly in the near future?
3. What are the factors likely to determine the demand for mega-liners in 10 or 20 years time?
4. How are the following industries related to each other – tourism, the airline business, airliner manufacture, jet engine production? Does the growth of one of them drive the growth of the others, or is there a third factor which drives the growth of all?
5. Why should strategic planning be a must in this industry? What would be the particular aims of such planning?

**Reading**

Daniel, C., ‘Condit focuses on domestic problems’, *Financial Times*, June 19, 2003: 29.

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Done, K., ‘Airbus set for Asian deal’, *Financial Times*, June 18, 2003: 30.

Economist, *The*. Special Report: ‘Boeing v. Airbus: towards the wide blue yonder’, April 27, 2002: 71–3.

Hill, C. W., ‘Boeing versus Airbus: trade disputes’, in *International Business*, 2003, McGraw-Hill Irwin: Boston, pp. 295–9.

Sanchanta, M., ‘Bridgestone wins Airbus tyre contract’, *Financial Times*, June 4, 2003: 31.

Sandilands, B., ‘Boeing’s jet has everyone guessing’, *The Australian Financial Review*, April 9, 2002: 68.

Wine, E. and Simensen, I., ‘EADS shares surge as Airbus outsells Boeing at Paris’, *The Financial Review*, June 21/22, 2003: M20.

**Relevant websites**

www.boeing.com

www.airbus.com

This case study is also relevant to Chapters 6, 9 and 14.
Key strategic lessons

• It is necessary to understand the influence of ‘bounded rationality’ on the strategist, that is, the constraints on the application of reason to strategy making. These constraints arise because of the limitations of the information available and the strategist’s ability to process what information does exist.

• The further the strategist looks into the future, the greater is the uncertainty. It is impossible to avoid all uncertainty but the level can be reduced.

• It is possible to distinguish four levels of uncertainty with respect to any future event or series of events: absolute or near absolute uncertainty; a range of possibilities with known limits; a finite number of discrete options; and complete, or near complete, certainty. The aim is to move as far as possible in the direction of complete certainty.

• The strategist converts information into valuable knowledge by selecting what is relevant to strategy making and placing it in the context of a strategy which can be realized. This requires considerable resources including the expertise of a number of ‘readers’ of the external environment.

• Reading the general environment for information about potential opportunities and threats is critical to successful strategy making. This requires scanning, monitoring, forecasting and assessing.

• The future can be dealt with by rejecting the possibility of forecasting, reducing future possibilities to a finite number of discrete options or believing in the possibility of exact prediction.

• Ignorance and uncertainty involves risk at the country, industry and enterprise levels. Risk can take a variety of forms at the enterprise level, all of which need to be anticipated in advance and managed.

• One effective way of forecasting is through scenario building which allows prediction relevant to a particular project and a sensitivity to future possibilities. The key is to distinguish between forces of change, predetermined elements and critical uncertainties.

Applying the lessons

1 Define the following terms – reading the environment, scanning, monitoring, prediction, foresight, forecasting, assessing, uncertainty, risk, scenario building and scenario planning.

2 In what ways does ignorance or, more specifically, the lack of certain knowledge of the future influence the process of strategy making and the content of any strategy?

3 Indicate how you might set about establishing an information strategy. What factors will determine the level of commitment of resources by an organization in converting information into knowledge relevant to strategy making? Who might do the relevant reading of the environment? Should they be full-time readers? What should their relationship be to the strategists?

4 In an industry of rapid change and intense competition, it may not be possible to predict outcomes with any precision. Choose one such industry and indicate how it is possible to develop a strategy without the availability of accurate forecasts.

5 Consider the industry in which you work or have had experience. What are the risks to which you would be exposed if and when you create a new enterprise or business unit in that industry? How might you classify these risks?

6 Imagine that you are either the lead underwriter of a Lloyd’s syndicate or a name backing that syndicate. How might scenario building have assisted you in anticipating the problems of the late 1980s and the early 1990s (see the Strategy in Action in Chapter 14)?
Strategic project

1. It is possible to set up scenario-building exercises in many different areas of interest. There are several examples given throughout the book. The object of this project is familiarize the reader with the procedures for implementing scenario building.

2. Set up a scenario-building exercise on the general movement of prices in future world markets, not just local markets such as Japan. Under what conditions would a deflationary outcome be likely to occur? This requires a careful analysis of relevant forces for change, predetermined elements and critical uncertainties.

3. Take a particular industry and a project in that industry and refine the scenario building to take account of the specifics of the project and the industry in order to evaluate the consequences of deflation.

The main authority on bounded rationality is Simon, 1955: 99–111 and 1976. Quinn, 1993, is the person most associated with the notion of the enterprise as a learning organization. This book should be read with Senge, 1990.

There is a relatively sparse literature on reading the environment. On scanning there is Elenkov, 1997: 287–302. See also Yasai-Ardekani and Nystrom, 1996: 187–204. More generally there is Hilmetz and Bridge, 1999: 4–11, Goll and Rasheed, 1997: 583–91 and Aggrawala, 1999: 83–104.

A good introduction to the problems of dealing with the future is Ackoff, 1983: 59–69. A more weighty treatment, exploring the notion of foresight, or remaking the future, is Hamel and Prahalad, 1994, or in a shorter version, 1989.

The problem of uncertainty and how to classify its level is analysed in Courtney et al., 1997: 66–79. A general introduction to the various kinds of risks is Saunders, 2000.

There is a rich literature on scenario building which originates with the attempts by Royal Dutch Shell to undertake such work. Many of the leading thinkers in this area worked at one time for Royal Dutch Shell. However, their influence has spread widely. The pioneer was Wack, 1985a: 73–90, 1985b: 131–42 and 1989: 60–3. Another early pioneer was de Geus, 1988: 70–4. Another early work is Mack, 1986: 125–33.

Closely following the pioneers was Peter Schwartz, 1996, who has written perhaps the most popular and accessible book on the subject. However, for those with an inclination to a more theoretical approach see van der Heijden, 1996. Outside the Shell school there is a book which has very much the feel of a primer for practising managers, Ringland, 1997. A useful but shorter treatment is Schoemaker, 1993: 193–213.

For a negative view of the attempt to forecast see Hogarth and Makridakis, 1981: 115–38, or at greater length Makridakis, 1990. Mintzberg has generally supported this position in his work. The reasons why many enterprises read the future very badly are discussed in an interesting paper and a powerful argument put that this is avoidable: Watkins and Bazerman, 2003: 72–85.