

**SLIM/SLIP: a Proposed Method for
Linking a Business Strategy to the
Strategic Systems Development Process**

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ABSTRACT

FACULTY OF SOCIAL SCIENCE
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**SLIM/SLIP: A PROPOSED METHOD FOR LINKING A BUSINESS STRATEGY TO
THE STRATEGIC SYSTEMS DEVELOPMENT PROCESS**

by Wilfred Alan Eardley

The research begins with a number of research questions that are based on the relationship between the creation and promulgation of a business strategy and the development of strategic information systems and information technology (IS/IT) applications. A literature search is carried out in three academic domains; namely, the business strategy processes, the strategic use of IS/IT applications and the frameworks and techniques that are used to define and to develop such applications. This investigation, in conjunction with the research questions, leads to the identification of a set of strategic components that are believed to improve the process of linking the business strategy to the development of strategic IS/IT applications. These components, namely strategic vision, strategic positioning, strategic flexibility and strategic cohesion or alignment, form the basis of a set of research hypotheses. Here, it is postulated that the four strategic components are important to the successful development of strategic IS/IT applications.

These research hypotheses are examined through a survey carried out among 961 successful UK companies. The survey provides useful information about the strategic use of IS/IT in such organisations and shows that a significant number of the responding companies attribute the success of their strategic systems to the presence of the postulated strategic components. Further information is gathered through the survey that relates to the methods and techniques that the organisations have used to link their business strategies to the development of strategic IS/IT applications. The findings of the survey support the research hypotheses and open the way to the second part of the research. In this part, a further literature survey is carried out that involves the investigation of existing techniques that may support the strategic linking components. Methods and techniques that have been used in a variety of business and IT contexts are identified, and a number of them are proposed for inclusion in a proposed method for supporting the process of linking the business strategy to the development of strategic IS/IT applications.

This proposed method, called SLIM/SLIP, is described and is validated by using a quasi field study. This involves in-depth interviews with respondents from six of the companies that participated in the original survey. The interviews consist of an informal examination of the effect of the SLIM/SLIP method if it had been used in the development of the firms' strategic IS/IT applications. Through this exercise, a number of theories are developed that are held to validate the use of the proposed SLIM/SLIP method for supporting the strategic linking process in a range of typical UK companies. The work finishes with a critical evaluation of the research project as a whole and suggestions for future research. It is held that there is considerable scope for further work in the area, particularly the 'packaging' of SLIM/SLIP as a commercially viable method and the observation and documentation in case studies of the method in practice.

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Chapter 1

Introduction to the Research

This chapter begins by describing the background to the research and the factors that prompted it. It includes a definition of the terms that appear throughout the thesis, and a basic introduction to some of the concepts that are crucial to an understanding of the thesis. Finally, a brief 'road map' to the thesis is provided and the main contribution of the research is identified.

1.1 Background

The research was inspired by the researcher's commercial experience as a middle manager and then a systems analyst in a number of UK companies. In these roles the following dilemma was identified:

- As a middle manager, a definite process of business strategy development could be observed that appeared to have features common to many organisations. Strategy development progressed through clearly identifiable stages and employed many common techniques. This process was relatively self-contained, but usually involved intelligence-gathering and analytical activities, and often included budgets and business plans for the various functional areas among its deliverables;
- As a systems analyst a process of planning and developing information systems and information technology (IS/IT) applications could be observed that shared many of the features of the business strategy process. It was similarly structured and was also consistent in its approach. Its practitioners also used a specific vocabulary and techniques but the language was different and the objectives and terms of reference had little in common with those of the strategy development process.

However, it seemed that the link between these two domains was at best tenuous. In the business domain, strategic managers often created strategies which depended on the support of IS/IT applications but were frustrated by the inability of the technologists to link the outputs from the strategy process to the IS/IT development process. Conversely, the systems developers bemoaned the inability of the strategists to provide them with valid inputs to their systems development process. This artificial separation of the business and technical domains appeared to cause the failure of a number of potentially attractive strategic manoeuvres.

As a teacher (initially of business policy and later of IS analysis and design) the dilemma was repeated. The business strategy literature describes a number of examples of frameworks and methods for modelling different versions of the strategy development process and a rich range of techniques that can be used to support the process (e.g. Gao

et al. 1997). The corresponding IS/IT literature describes an equal or greater number of methods and techniques. However, there are few explorations of the linkages between the two domains, even though the establishing of such links could provide a valuable contribution to both practice and the literature. It was an interest in this linkage between the two domains that triggered the researcher's interest. Before the research project began, the researcher had developed an experiential belief that, in order to support a typical business strategy, a strategic system would have to provide support for certain factors. These were believed to be as follows:

- Support for strategic manoeuvring (or jostling for strategic position);
- The ability to cope with a changing business environment (or robustness and flexibility);
- A capacity to act in support of the organisation's business goals (or vision);
- A recognition of the importance of ensuring cohesion or compatibility between technical and functional strategies;
- Support for the activities that make up the organisation's value chain.

It was felt that these factors linked strategy to systems development, and that a deeper understanding of them could improve the general knowledge of strategic IS/IT applications. The research sets out to explore these factors and, if they are found to be important, to make use of them in improving the process of development of strategic systems.

The objectives of the research can therefore be summarised as follows:

- To identify the key components of strategic IS/IT applications development process that are similar to those elements (i.e. entities, processes and life cycles) that form the basis of 'conventional' systems development methods;
- To identify in the literature those methods, frameworks and techniques that could help form a bridge between the business strategy process and the development of strategic IS/IT applications;
- To identify the techniques that are used in UK companies to link their business strategies to their strategic IS/IT applications and to assess the place of such techniques in the development of strategic systems;
- To propose and validate a strategic linking framework that would form the basis of a practical and productive method.

In summary, it may be possible to produce a framework, method or set of techniques that will link an organisation's business strategy process to its development of strategic IS/IT applications in a way that will aid the development of effective strategic systems.

1.2 Terminology

A glossary of terms is provided but a number of definitions are key to the thesis and, as these are not always defined consistently in the literature, they will be explored briefly in this section:

- **Strategic IS/IT applications** are those that are critical in providing direct support for specific business strategies (Lederer and Sethi 1988). This is different from the concept that IS or IT in general may be of strategic importance to a given organisation for a variety of reasons (e.g. Earl 1989). It takes into account the fact that any type of application - even transaction processing systems - may have a strategic role (Andreau *et al.* 1991);
- **Strategic IS planning (SISP)** includes all those planning activities that are directed towards identifying opportunities to use IS applications to support an organisation's business strategy and maintaining an effective and efficient IS function (Premkumar and King 1994). This implies a mixture of strategic and non-strategic applications, as the plan, '...includes the primary business functions (e.g. accounting, payroll, billing, etc.) as well as any strategic information technology thrusts' (Forman 1989). The research concentrates on the planning of strategic applications, rather than the strategic planning of all applications;
- **IS/IT management** is the area of management which seeks to integrate IS and IT considerations (e.g. IT acquisition, data management, IS applications development etc.) with the management of other business activities. The IS/IT management function should be an integral part of the overall corporate management task (Galliers 1991a) although experience suggests that this is rarely the case;
- **Strategy** is the 'pattern or plan that integrates an organisation's major goals, policies and action sequences into a cohesive whole' (Quinn 1992, p.5). In this view, strategy involves a firm in organising and allocating its resources in support of a posture (usually based on its distinctive competencies or special abilities) that is taken in response to changes in its environment and actions by intelligent rivals. The term strategy originated in a military context (Sun Tzu 1963) and 'migrated' in common use *via* a political context to the field of business management (Ohmae 1982). The concept of strategy, then, has close associations with competition and conflict, although it fits well into an organisational or business context;
- **Objectives** define what is to be achieved (i.e. the goals of the enterprise) and often, by virtue of the planning process, when they are to be achieved, but rarely how. Organisations tend to have multiple sets of objectives that are complex and hierarchical and that exist in different forms at various levels within their structure. The highest level goals that apply to the whole organisation are called strategic objectives (Quinn 1992);

- **Policies** are the rules or guidelines that support the organisation's objectives by defining the limitations that impinge on the strategic process. They often take into account norms of organisational behaviour and frequently serve to resolve conflicting objectives. As with objectives, policies can be complex and hierarchical and, at the top level, are termed strategic policies (Quinn 1992);
- **Programmes** are long-term sequences of actions that seek to specify how organisational objectives are to be achieved within the limits set by the organisation's policies. A programme may involve a number of projects, manoeuvres or moves, which are intended to secure strategic positions, to achieve strategic objectives or to enable policies to be carried out;
- **Frameworks** are devices for describing, explaining or communicating some aspect or aspects of a strategy or a strategic system. A framework is used as a guide to action and to promote communication on pre-defined issues and may include or be based on a number of techniques (Earl 1989). A framework differs from a method or methodology in that it is less prescriptive in the use of techniques and lacks orderliness or procedure. For this reason frameworks can be seen as static 'maps' and are often represented graphically as matrices or block diagrams. A framework, like a method (see below), can contain a number of techniques, or it can be the equivalent of a single technique;
- **Methods** are defined or set procedures for approaching tasks or ordering activities in pursuit of some goal. A method, like a framework, will usually contain a number of techniques, but will be more prescriptive in their use. A method also has consistency in that the procedures are repeatable and is dynamic in that the techniques are applied serially over time. For this reason methods can be seen as guidebooks and are often ordered as a series of stages or phases at which the techniques are applied and deliverables are produced. In the field of IS development the term methodology is often used in this context, implying that the method is driven by a guiding philosophy (Antill 1985). Most dictionaries use this term to describe a body of methods, implying that a number of similar methods would constitute a methodology. Method will therefore be used to describe individual methods and methodology to refer to categories of method except where otherwise indicated;
- **Techniques** are means of achieving a result or aiding the execution of tasks. An element of 'mechanism' is implied by the term, supporting and perhaps replacing to a certain extent particular practical skills. In the area of the current research, most of the techniques are of a diagrammatic or graphical nature and are therefore very similar to frameworks. It is assumed that the difference between a technique and a framework is one of intent, in that many of the entities which Earl (1989) and Doyle

(1991) refer to as frameworks are also capable of being regarded as techniques. In the thesis a technique is something which is intended to effect a transformation or to produce deliverables, whereas a framework is used to educate, to identify potential or to raise awareness;

- **Processes** are procedures that are less well defined or prescriptive than methods. A process has the same sense of an orderly series of actions, but is more generalised than a method and less likely to be proprietary in nature. In the thesis, therefore, a specific systems development procedure is referred to as a method but the whole field of systems development is termed a process;

Bold style text is used throughout for chapter and section headings and for figure labels, and *italic style text* is used for words in languages other than English. Emphasis is indicated by the use of underlined text.

1.3 The Structure of the Thesis

Chapter 2 summarises the process of choosing the research approach and discusses the factors that affect that choice. It goes on to describe a process of refinement in which experiential beliefs are expressed as research questions which in turn form the basis for hypotheses which may be tested in the research. The choice of a methodology is particularly important in socio-technical research such as this, as it must overcome the inherent difficulties in drawing objective conclusions from subjective experiences and observations such as those described above. Before the researcher's beliefs may be translated into questions that can be tested by research, it is necessary to explore and describe the literature from the strategic systems and strategy development domains, and to describe the frameworks, methods or processes which are said to link these domains.

In Chapter 3 the concept of strategic IS/IT applications is examined and, by reviewing some examples of such systems, the reasons for regarding them as strategic are identified. A common business framework is adapted for use in validating the concept and illustrating the link between business strategy and the technical features of strategic IS/IT applications.

In Chapter 4 the literature describing the business strategy process is examined and the different approaches to strategy development are categorised. By examining the features of various strategies it is concluded that the current view of strategy is inadequate for describing the linkage between strategy development and strategic IS/IT development. Four components are identified that are held to be important in describing this linkage. These are strategic positioning, strategic flexibility, strategic vision and strategic cohesion or alignment. These are similar to the factors that made up the researcher's beliefs at the start of the research, but the support for value chain

integration is not included. It is concluded that a method or framework that is to support the development of strategic IS/IT applications will need to represent or model these components to be effective.

In Chapter 5 the concept of strategic IS/IT frameworks is described and the use of a sample of the frameworks is illustrated by using a commonly accepted 'meta-framework'. The chapter then examines specific examples of existing frameworks and planning methods for their suitability in supporting the linkage between the business strategy and strategic IS/IT application development processes. The conclusion is that none of the methods which are currently available to help strategists and systems developers in this task are adequate for modelling the four components of the linkage that are described in Chapter 4. This chapter is important as a preparation for the next part of the thesis, in which the four components are examined in detail and methods are suggested for integrating them into the strategic systems development process.

In Chapter 6 the research questions are revisited in refined form, some methods for designing a valid research instrument are examined and the issues of sampling and analysis are addressed. This leads to the design and distribution of a questionnaire designed to test the hypotheses that are developed from the research questions. The chapter also includes an analysis of the test results and a review of the implications of this survey for the remainder of the research. The results are also important in their own right as a useful addition to the literature.

The next four chapters suggest techniques to support the four linking components. Although most of the techniques that are recommended are already in existence and most have been tried practically or academically, their combination and use in this context is an innovation and is offered as a contribution to the body of knowledge in the area of strategic systems.

Chapter 7 addresses the first hypothetical component (i.e. the issue of strategic positioning) as a major tool of a competitive business strategy. In this chapter the concept of positioning is discussed and the benefits to a business of establishing a position in relation to its rivals and of changing the basis of competition in its market sector are examined through examples. A number of candidate frameworks or techniques are evaluated for their compatibility with the strategic positioning component by promoting the use of IS/IT in support of strategic manoeuvres, and a recommendation is made for a method based on selected techniques.

Chapter 8 examines strategic flexibility as the next component of the linkage. It is proposed that a flexible strategy is of particular importance to an organisation in a turbulent business environment and is necessary to provide a high degree of flexibility to allow strategic manoeuvres to be enacted rapidly. The role of a flexible IT infrastructure in supporting a flexible business strategy is discussed and a suitable framework is suggested for use in this context. A set of candidate techniques for linking the framework to the IS/IT development method is examined, and a recommendation is made of a method for use in supporting this component.

In Chapter 9 the third component of the linkage, namely strategic vision, is addressed. In this chapter the importance of establishing a corporate vision as a part of strategy is discussed and examples of the use of vision in enabling strategic success are examined. Subsequently a method based on a set of techniques following a life cycle is recommended for helping an organisation to create and promulgate a strategic vision and to develop it into a strategic IS/IT application.

Chapter 10 confronts the important issue of strategic alignment, which has important implications for the research in that it deals with the alignment of the business and IS/IT strategies and also the way in which the components of the linkage process fit together. In this chapter it is contended that success in linking strategic IS/IT applications to the process of developing a business strategy depends on the level of cohesion between the IS/IT strategies and the strategies which are developed in the business functional areas. To this end a framework for strategic alignment is examined and extensions to the framework are suggested for supporting this component.

In Chapter 11 the themes of the four previous chapters are drawn together and the techniques that are intended to support the strategic linkage components are synthesised into a method for supporting the development of strategic IS/IT applications. Applications developed by using this method should display a greater degree of alignment, and be more flexible, visionary and competitive than would be the case without the use of such a method or with other existing methods. This proposed method is called SLIM/SLIP.

Chapter 12 consists of a validation of the proposed SLIM/SLIP method by retrospectively 'walking through' the process of developing actual strategic IS/IT applications with the managers of six of the companies that were involved in the survey. The proposed SLIM/SLIP method is the major contribution of the research to the area of strategic IS/IT applications. This chapter finalises the research by summarising the

findings, highlighting the contribution of the research to the body of knowledge and examining the implications of the research and drawing conclusions from both the primary and secondary research. The structure of the thesis, and the focus and content of each chapter, is summarised in Figure 1.1.

Chap.	Focus	Purpose
1	Introduction	Background to the research, research context, organisation and scope of the thesis. Definitions.
2	Research methods	Choice of research method; development of research questions and hypotheses. Survey population and data gathering.
3	Strategic IS/IT	Literature search. Examples of strategic IS/IT applications; use of a strategy framework to demonstrate the concept of strategic IS/IT.
4	Business strategy	Literature search. Approaches to strategy development; description of the strategic process; identification of four components
5	Strategic frameworks	Literature search. Use and purpose of strategic frameworks in developing IS/IT applications; strategic systems development methods.
6	Survey and analysis	Primary research. Choice of target population; design of research instrument; analysis of results and implications of the survey.
7	Strategic positioning	Description of the first component of linkage. The importance of positioning and environmental analysis in competitive strategy; suggestions for a framework for strategic positioning.
8	Strategic flexibility	Description of second component of linkage. The need for flexible strategy; discussion of a strategic flexibility framework; suggested linking techniques for reinforcing the framework.
9	Strategic vision	Description of the third component of linkage. The importance of vision in developing strategy; suggestions of a process for incorporating strategic vision in IS/IT applications.
10	Strategic alignment	Description of the fourth component of linkage. The importance of cohesion and alignment between the business/functional strategies and strategic IS/IT developments.
11	SLIM/SLIP method	Suggested method for linking business strategy and strategic IS/IT applications development.
12	Conclusions	Validation of SLIM/SLIP method on reduced sample.

Figure 1.1 The Organisation and Structure of the Thesis

1.4 Summary

This introduction establishes the background to the research, discusses the initial research questions and identifies the structure and pattern of the thesis. It also presents a definition of some of the important concepts and terminology from the research domains and explains the relevance of the terms to the research so that the reader may obtain and develop a consistent understanding of the work. The next substantive stage of the research is to describe the available research paradigms and research methods that support these paradigms, to select those that are appropriate to the nature of this project and to combine them into an effective research design. This is a necessary prerequisite for the subsequent literature search and the formulation of the research hypotheses and is therefore the subject of the next chapter.

Chapter 2

The Research Design

The choice of a research design is obviously a crucial decision upon which the success and effectiveness of the research must hang. The relationship between the research paradigm (i.e. the philosophy under which the research is carried out) and the research methods (i.e. the techniques that are used to carry out the research tasks) is a complex one, which can make the choice of both elements difficult. Further, the choice of an effective role for the researcher must be made in the context of the underlying assumptions, beliefs and knowledge relating to the research (Hirschheim and Klein 1992b).

The situation is complicated by the number of research methods that are available and have been described and recommended in a variety of contexts (e.g. Mumford 1987). Also, the range of research perspectives is wide, varying from organisational theory (Cludts 1999, Cooper 1996) through the phenomenological movement (Kaplan and Maxwell 1994) to scientism (Farhoomand 1992, Klein and Lyytinen 1985, Weick 1984). The area is well researched, although the ‘...unfortunate preponderance of Information Systems discourse which does not adequately deal with the question of the choice of research approach...’ has been noted (Galliers 1992). This section identifies the components of a suitable research design (i.e. the factors which are likely to make a research project successful), examines the alternative paradigms, methods and researcher roles, and makes a selection. Finally, the production of the research hypotheses is discussed.

2.1 Elements of a Research Design

It is apparent that this crucial choice of method will be governed by a number of research factors or elements, which can be stated explicitly and examined in advance of the decision being made, in order to inform and to aid the choice. The elements are: the research paradigm, the research methods, the role of the researcher and the research questions and hypotheses (where applicable). These research design factors are itemised in the following section and are chosen to fit the research design and described in more detail later in the chapter:

2.1.1 A Research Paradigm

All research is based on certain underlying assumptions and beliefs about what the research is about, the role of the researcher and the methods that are appropriate for carrying out the research. It is necessary to understand the basic assumptions (or

philosophical perspectives) behind the research in order to make valid choices about these factors. A research paradigm is deemed to be suitable for a given research project if it is compatible with the research domain or application. It may not be appropriate, for instance, to apply a research programme that supports a positivist paradigm to domain in which human opinions or heuristic judgements are a major feature. The research paradigm governs the overall approach of the research, and as such is perhaps the most important choice that must be made. The issue of the selection of a research paradigm is discussed in detail in Section 2.2.

2.1.2 Research Methods

There should be available a range of research methods from which an appropriate method may be chosen. The available methods should be feasible, that is, they should all be capable of being applied to the domain within the constraints of time and cost, and they should have validity in that the researcher should be able to judge the success (or failure) of their application. A suitable research method is one that fits in with the chosen research paradigm (e.g. positivist or interpretivist) and at the same time supports the research tasks. It would, for instance, usually be most appropriate to employ detailed statistical analysis methods to support a positivist (rather than an interpretivist) research paradigm. The literature shows that there is no shortage of techniques that are suitable for the research, but the difficulty is in choosing the correct method. This issue is discussed in detail in Section 2.3.

2.1.3 The Role of the Researcher

The role of the researcher in the research process should be clear and should be appropriate to both the research domain and to the chosen method(s). The researcher may be an outside observer or recorder or may be actively involved in the research domain through the medium of action research (Baskerville and Wood-Harper 1996). The corresponding roles of the researcher and the 'research client' are also important, as there can be tensions where the goals or objectives of these two types of stakeholder may be different (Trevino and Weaver 1999). In this project, there are a number of roles from which the researcher may choose, and these are discussed in Section 2.4.

2.1.4 The Research Questions and Hypotheses

It must be possible to frame a set of valid research questions upon which research hypotheses may be based. The research questions are instrumental in setting the objectives for the research and serve to focus the research on particularly critical aspects of the domain and to guide the researcher in terms of the choice of research methods and roles. In a way the total function of the research project is to test the validity (in a

positive or negative sense) of the hypotheses. The apparent paradox with regard to research hypotheses is, however, that there must be some knowledge of the research domain before valid hypotheses can be framed. This is less of a problem where the hypotheses that are being tested are widely held or are in the public domain (i.e. myths, 'lore' or statements of supposed fact). In this research project this is not the case, and therefore some domain knowledge is required to frame the research questions. This knowledge comes from a literature search in the first part of the project. These issues are discussed in Section 2.5.

2.1.5 Validation of the Research

Research at this level must provide a contribution to the level of knowledge in the research domain. One such contribution (the research outcome or deliverable) will have to be validated to ensure that the contribution is worthwhile. One of the major outcomes of this research is a proposal for a framework for linking the business strategy to the process of developing strategic IS/IT applications (see Section 1.1). This proposal must be validated in some way (e.g. by observing its use in practice, by testing it in some form of experiment, or by seeking the opinion of experts). When the results are capable of being generalised (i.e. held to be valid in general terms), the knowledge gained can be presented as a theory (another major contribution), which will improve practice in the research domain (described in Section 2.6). These research factors may be used as a framework that will allow the formation of a research design (a structure for the research) which will in turn form the foundation for the eventual thesis plan. The research factors described above are examined in the following section so that choices can be made to fit the research design:

2.2 Research Paradigms

Burrell and Morgan (1979) place research approaches into four paradigms that seek to describe the nature of assumption and proof. The paradigms are; functionalism, interpretivism, radical humanism and radical structuralism. The paradigms are described in two dimensions, the subjective/objective dimension and the regulation/change dimension. This classification of paradigms has been modified by Hirschheim and Klein (1992b), omitting assumptions about methodology and human nature (Iivari 1991), to include functionalism, social relativism (which corresponds to the interpretivist paradigm), neo-humanism (which corresponds to the radical humanist paradigm) and radical structuralism. The deterministic approach views human perception and reaction as being governed by the context, situation or environment within which the observer (and the observed evidence) are located. The voluntaristic approach postulates that the observer has a completely free will, and will be relatively uninfluenced by extraneous

factors. Similarly, a realist approach views the social world as being made up of hard and tangible facts which have an existence (i.e. a truth) which is independent of the situation and of the subjective stance of the observer. This implies a hard, concrete reality that makes assumptions that are amenable to concrete proof. Nominalism, by contrast, comprises the belief that assumptions are ultimately incapable of being proven. Reality, it is said, consists of indefinable concepts with names and labels that are 'artificial creations whose utility is based on their convenience as tools for describing, making sense of and negotiating the external world' (Burrell and Morgan 1979). This implies that before postulations or hypotheses can be tested there needs to be a considerable degree of agreement about what the terms and concepts mean. In practice, this degree of consensus is unlikely to be achieved in a subjective research domain. This is a problem when putting forward hypotheses in a soft domain, such as that including the linkage between business strategy and IT applications. An alternative epistemology has been suggested (Guba and Lincoln 1994) which embraces four paradigms: positivism, post-positivism, critical theory and constructivism. Orlikowski and Baroudi (1991) suggest a three-part categorisation based on the epistemology of the research and its philosophical perspectives. The paradigms called positivism, interpretivism and criticism are described in the following section:

2.2.1 Positivist Research

The positive viewpoint attempts 'to explain...what happens [in the social world] by searching for causal relationships between its constituent elements' (Burrell and Morgan 1979). It is assumed that 'the objective truth' is a valuable attribute that is independent of the role of the researcher and any instruments used in the research. The positivist approach is typified by formal propositions, measurable variables and the drawing of inferences about a phenomenon from a sample to a population (Orlikowski and Baroudi 1991). This attribute appears to make a positivist research paradigm most suitable for examining research hypotheses, but it is possible that the formulation and examination of hypotheses can have a place in research projects that are carried out under the interpretivist paradigm;

2.2.2 Interpretivist Research

The interpretivist paradigm implies that the acceptance of proof depends on the way in which sensory data derived from external reality is interpreted by the observer in the light of *a priori* knowledge and experience. Interpretivist research is therefore based on the assumption that 'subjective reality' is a social construct based on consciousness and the shared meaning of language. Therefore, they postulate that areas of sociological enquiry that involve a high degree of human subjectivity are not amenable to the

application of scientific method. Also the interpretivist paradigm tends to recognise relative, rather than absolute values of proof. There is no such thing as the absolute proof of theories or hypotheses, but just results that are more or less applicable or suitable, depending on the purpose of the research. Interpretivist research is aimed at 'producing an understanding of the context [of the system] and the process whereby the...system influences and is influenced by the context' (Walsham 1991). Interpretivism can be based on hermeneutics (Bleicher 1982) or semiotics (Liebenau 1990), both of which can be specific modes of analysis (Myers 1994). It is of particular relevance to the present research that the interpretivist paradigm has been used to research the understanding of strategic and organisational relationships (Myers 1997). It is felt that this research project fits best into the interpretivist paradigm;

2.2.3 Critical Research

The critical school believes that reality is a construct based on social, economic, political and cultural circumstances that apply at a given time and in a given place (Habermas 1996). Although these factors are, at least in theory, capable of being controlled by the actors in the research domain, there are over-riding social constraints to change which will tend to cause the *status quo* to be maintained. The examination of these restricting and conditioning conditions (i.e. social critique), leading to their comprehension and subsequent removal is the objective of critical social theory (Ngwenyama 1991). The critical approach has been used in a variety of contexts in qualitative research (e.g. Ngwenyama and Lee 1997, Hirschheim and Klein 1992a), but is not suitable for supporting testing hypotheses and is not used in this research. It is now possible to examine the available research methods in detail.

2.3 Research Methods

There are numerous candidate research methods or techniques that could be applied to this domain and there are several approaches to the categorisation of such research methods. Douglas (1976) envisaged a continuum of methods that places intuitive, subjective mental experiences (e.g. 'hunches' and visions) at one extreme and precise, objective techniques (e.g. mathematical models and computer simulations) at the other. The former categories give the researcher less control over the research environment, but with more flexibility and opportunities for participation in the research process. Methods in categories to the other end of the continuum provide more specific guidance but are less holistic in their application. Douglas uses the example of participative and non-participative field research methods to demonstrate his point. Jankowicz (1991) uses a framework that is similar to that proposed by Douglas, and which can be used to balance the qualitative and quantitative aspects of research (Remenyi and Williams 1996) and to select appropriate data gathering techniques. However, these 'continuum-based'

approaches to method selection appear to be over-prescriptive, vague and naïve and could mislead the practitioner through their generality and lack of practical detail. An alternative and more detailed taxonomy is suggested by Van Horn (1973) which is accepted as the basis for other schemes of categorisation (Avison 1990). Van Horn's taxonomy focuses on empirical research and includes four methods: case studies, field studies, field tests and laboratory observation. Ein-Dor and Segev (1981) adopt a similar typology, but differ mainly in adding surveys to the categorisation and in adopting an approach showing a bias towards experimentation rather than observation. Research methods that are suitable for use in the IS domain can be classified according to a set of commonly-accepted philosophical approaches that include the scientific, functionalist and interpretivist paradigms, and a 'soft' paradigm that includes phenomenology, hermeneutics and 'soft systems' methods. Practice over recent years has tended to divide research methods into two groups: scientific and interpretative (Galliers and Land 1987), resulting in the division of methods into two categories (Galliers 1992). It is clear from Galliers's work (see figure 2.1) that 'interpretivist' methods for suit the research paradigm of the same name, and the 'scientific' category of method would fit in with the positivist paradigm (see Section 2.2.1).

Interpretivist	Scientific
Description and/or interpretation	Case studies
Action research	Surveys
Subjective arguments	Laboratory experiments
Field experiments	Reviews
Statistical forecasts	Futures research
Simulation	Role playing
Theorem proving	(No direct equivalent)

Figure 2.1 Interpretivist & Scientific Methods (after Galliers 1992)

Methods in the scientific or positivist category are characterised by repeatability, reductionism and refutability (Checkland 1981) and are said to display high degrees of rigour and objectivity (Klein and Lyytinen 1985). A typical view of a proponent of one of the scientific methods is, 'The empirical/analytical method is the only valid approach to improve (*sic*) human knowledge,' (Bleicher 1982). However, Galliers argues in favour of validity of interpretivist methods, believing that scientific methods may be out of place in a socio-technical domain (such as the present research) for the following reasons:

- There will be a number of different interpretations of social phenomena, based upon the perspective and experiences of the researchers;
- The involvement of the research is likely to have a measurable impact on the subject area and to create a disturbance in the results of the research as a result of the so-called 'Hawthorne effect' (Gottfredson 1996);
- Future events in the field of human activity systems are notoriously difficult to understand in terms of cause and effect, and, in combination with the above point, this creates an increased chance of the occurrence of 'self-fulfilling prophecies'.

Research method	Description	Application area(s)
Literature search	Examination of a body of published knowledge	Gaining knowledge, hypothesis formulation.
Case studies	Concentrated analysis of small samples, detailed evaluation without experimental controls	Description, interpretation and hypothesis formulation.
Action research	Direct participation and/or intervention in the domain by the researcher	Theory development and testing
Laboratory experiments	An artificial domain is created in which independent variables are controlled tightly	Hypothesis testing and/or simulation
Surveys	Hypothesis testing on data that is gathered uniformly from a known population	Hypothesis development and testing or description
Field studies	Changes in the domain are studied/noted by recording the experience(s) of participants with little or no control over the research variables	Historical or current examination of processes and/or hypothesis development and testing. Validation of proposal(s)

Figure 2.2

A Summary of Research Methods

Interpretivist methods may therefore be useful in developing research frameworks (Earl 1989) and have an important role in augmenting or combining with positivist research methods. Many researchers have advocated the use of such a combination of methods (e.g. Gable 1994, Banville and Landry 1992) to create a multi-disciplinary research process called triangulation (e.g. Lee 1991, Kaplan and Duchon 1988). A summary of the available research methods is presented in Figure 2.2.

In conducting research in a complex domain, it is sometimes advisable to recognise the shortcomings of individual research methods and to seek to overcome the bias that is inherent in their separate use by adopting a combinatorial approach (Jarvenpaa 1988). Some researchers (e.g. Galliers and Land 1987, Jarvenpaa 1988) propose a model in which the methods combine to produce a 'chain of research'. For instance case studies can be used to develop research questions, which then allow hypotheses to be constructed, which are in turn tested by using survey methods (i.e. questionnaires or interviews) to gather data in the field. This data is then analysed and theories are produced, resulting in an expansion of the body of knowledge in the research area. The theories can be validated, extended or modified in the future and can be re-tested using similar survey methods.

Such pluralist approaches have been noted as being particularly suitable for use in the IS domain (Banville and Landry 1989) and therefore are worthy of careful consideration for use in this research. While there is no doubt that combining a number of research methods into a single research design can provide the advantages of richness and synergy (Kaplan and Duchon 1988), it should be noted that the various methods must be integrated correctly to provide a balance of theory and practice. It is important to avoid 'methodological prescriptions which bias the research or which to some extent dictate the research findings' (Pettigrew 1985). The following section combines the work of Galliers (1991b) and Wynekoop and Conger (1990).

2.3.1 Literature Search

A literature search forms an important part of most research projects, and serves to increase the researcher's understanding of existing work which relates to the research domain, to place the particular research project into context within an existing body of knowledge and to provide a theoretical foundation for the research. It is therefore a prerequisite of this research exercise, and therefore forms an important part of the research design. A literature search in three domains (strategic IS/IT applications, strategy and strategic systems frameworks) is used to develop the research theme and to establish the research hypothesis for the project.

2.3.2 Case Study Research

A method based on the use of case studies is sufficiently versatile to have a place in developing a research theme and in developing and testing a research hypothesis. It has been shown to provide a holistic and detailed approach and can be used for longitudinal exploratory and descriptive studies over time, but has restrictions in terms of the size of sample which can be included and the degree of control which can be applied to the research. Although there is no commonly accepted definition of a case study, the process implies the examination and recording of a situation or phenomenon in its natural setting over a period of time (Benbasat *et al.* 1987). Typically, the researcher does not intervene in the case study situation (Jenkins 1985) and no control is exercised over the research domain.

Case study research may employ multiple methods of evidence or data gathering (e.g. interviews, questionnaires, observation and the examination of archives or documents) and may be applied to past, present or future situations. Benbasat *et al.* (1987) feel that the case study research method is most appropriate for studying a current situation, but Galliers (1991b) introduces the ideas of longitudinal studies. Here a situation is studied over a period of time, and futures research where different scenarios and developments are simulated *pre hoc* and are evaluated. Yin (1994) feels that case studies are most useful where the boundary between phenomenon and context are not clearly evident. Benbasat *et al.* (1987) also makes the point about a usefulness of case studies in the absence of a theoretical base and the suitability of the method for qualitative research (Silverman 1998).

They regard their use as most appropriate where the subject of the research cannot be separated from its particular setting. Yin (1994) and Benbasat *et al.* (1987) advocate the use of case studies in positivist research, whereas Walsham (1991) is advocating an interpretive approach. Bonoma (1985) believes that case studies are valid for hypothesis testing and Benbasat *et al.* (1987) agree that their use in this way is a legitimate research practice. Cavaye (1996) describes the flexibility and variety of the approach and its applicability to theory development has been noted (deLooff 1995). Balancing these favourable attributes, the case study method has the disadvantages of a high cost of application, a possible lack of control over time scale and a high degree of subjectivity in its interpretation. An important function of this research project is to discover industry practice in the strategic IT domain and this requires a latitudinal approach to compare a range of subjects and requires relatively little descriptive detail. Case studies would therefore be too labour-intensive for this research, so their use is not proposed.

2.3.3 Action Research

This method has been shown to demonstrate the same degree of versatility as case study research (Susman and Evered 1978) and to develop both theoretical and practical knowledge of the research domain (Benbasat *et al.* 1987). Unless the researcher happens to identify laws or circumstances that apply generally, however, the use of case studies and action research interventions can result in a series of loosely related cases (Nissen 1985). However, the two methods are differentiated by a fundamental difference in the role of the researcher (Avison *et al.* 1999). Whereas the case study method has the researcher as a passive observer or independent outsider, in action research the researcher is a direct and active participant in the research process. Argyris and Schon (1989) describe action research as an iterative process of refinement, in which research ideas or hypotheses are developed, tested and modified repeatedly in the light of real-world experience. The result of this unique relationship between the research method and the research domain is that the knowledge obtained from the research can be applied and used much more quickly than with other research methods. Action research is therefore essentially empirical and pragmatic, as Hult and Lennung (1980) point out:

Action research simultaneously assists in practical problem-solving and expands scientific knowledge...being performed collaboratively in an immediate situation, using data feedback in a cyclical process aimed at increased understanding of a given social situation...

(Hult and Lennung 1980, p.50)

Susman (1983) describes the concept of the 'learning cycle' that links diagnosis, planning, taking action, evaluation of results and the definition of learning outcomes reinforces this view of the cyclical nature of action research. This property of action research makes it particularly suitable where the object of the research is an understanding of the process that is being studied, rather than the elicitation of facts or outcomes from the process. The action research method would therefore be suitable for testing the research hypotheses that are generated by the research, but in this application the suitability of the method is limited because of the strategic nature of the domain. The domain of this research (i.e. developing business strategy and linking it to long-term IT and IS developments) is not likely to be amenable to the direct intervention of an academic researcher, and therefore the action research method is deemed not to be suitable for this research project.

2.3.4 Laboratory Experiments

Such experiments allow a degree of control over the research process and can provide results that are very amenable to statistical analysis. The main features of laboratory experiments are that factors relating to the process of research must be under the control

of the researcher. Typically, independent variables are subject to a high degree of manipulation, irrelevant factors are suppressed and the behaviour of dependent variables is recorded. A separate category of field experiments seeks to apply the features of laboratory experiments into real-world (rather than artificial) situations (Galliers 1991b). The category of laboratory experiments includes experimental simulation, free simulation (Dickson *et al.* 1977) and experimental gaming. In a simulation a model of a real-world situation (i.e. the whole or a part of the research domain) is created, and real or artificial data is fed into the model to allow an analogue of the real world to be produced. The researcher may then use the results of the simulation to test hypotheses or make deductions. Jenkins (1985) describes experimental simulation as a closed mode of operation and free simulation as an open mode. The important difference is in the degree of control that the researcher has over the organisation of the experiment and the degree of influence that the subjects of the simulation have over the conduct of the research. Experimental gaming and the related category of small group experiments (Dickson *et al.* 1977) typically use a simulated scenario about which the subjects can interact and about which they can make decisions under the control of the researcher. Laboratory experiments are often used for the verification and testing of hypotheses where the research is of a quantitative nature and the research domain is either simple or relatively stable, although Gable (1994) considers them to be a poor method for verifying hypotheses. It would, however, be impossible to provide the artificial conditions that would be required in the proposed research domain, and there would be no way to exercise the necessary degree of control over the research process. Laboratory experiments are sometimes used for developing and testing research hypotheses, but are not suitable for use in this project.

2.3.5 Survey Research

Surveying methods usually involve the gathering of subjective data (opinions, beliefs and attitudes) from subjects who are stakeholders in the situation that is being studied. Surveys are usually conducted by the systematic use of one of (or a combination of) three techniques: personal interviews, telephone and mail surveys. The method would fit into the control end of Douglas's continuum, with interviews being positioned the most centrally of the three techniques, due to its more subjective nature and the reduced control over the process that the researcher may have. Surveys, by definition, tend to involve a significant number of subjects and can produce large amounts of data. The research process requires the use of statistical analysis, which can create a tension between the subjective, qualitative nature of the raw data and the quantitative objectivity in the interpretation of the results. Galliers (1992) offer the criticism that this dichotomy makes survey methods inappropriate for capturing the complex interaction between the research

variables. Wynekoop and Conger (1990) identify other major disadvantages that are centred on the interpretation of results over time and between different settings.

Nevertheless, there are many examples of research in which surveys have been used as the main research method, even though they have been identified as not being particularly suitable for analysing the complex causes and relationships which can typify the IS domain (Galliers 1992). Surveys have been shown to be applicable to hypothesis development and testing and to be versatile in their application, in that they can be carried out in a number of ways. As they can be structured (e.g. questionnaires) or free form (e.g. face-to-face or telephone interviews) they would be suitable for use in the hypothesis-testing phase of this research project, and could be used with a stratified sample. First, a large-scale survey can be used to establish industry practice, followed by a more detailed survey (perhaps using interviews) of a segment of the participants to establish opinions and experiences in more detail. This approach will be used in the present research, with a follow-up survey to validate the proposed model being carried out by the use of a quasi-field study, as described in Section 2.3.7.

2.3.6 Grounded Theory

Grounded theory seeks to develop theories (i.e. rules or facts that are capable of generalisation) that are derived from data that are gathered and analysed systematically (Glaser 1992). Grounded theory (GT) has been used in a variety of research contexts and suggests a continuous interplay between data collection and analysis (e.g. Star 1998, Myers 1997), and is therefore considered to be suited to the use of empirical field studies based on interviews (Orlikowski 1993), being:

An inductive theory discovery method that allows the researcher to develop a theoretical account of the general features of a topic while simultaneously grounding the account in empirical observations

(Martin and Turner 1986, p.20)

GT sprang from the American pragmatist tradition and was developed as a reaction to the failure of existing research techniques in the social sciences (i.e. healthcare) 'due to [their] heavy emphasis on theory testing and verification' (Glaser and Strauss 1967). The GT approach seeks to develop a theory 'in intimate contact with the data' (Fitzgerald 1997), usually by allowing the data-gathering phase to develop organically, as with interviews or action research methods, rather than being predefined, as with case studies or questionnaires. GT 'seeks to develop theory that is grounded in data systematically gathered and analysed' (Myers 1997). The GT approach has a solid foundation in IS/IT research through the work of Miles and Huberman (1984), Toraskar (1991) and Calloway and Ariav (1991). The latter identify a series of five stages or

activities for use constructing and tested hypotheses, gathering and analysing data or developing theories using the GT approach. GT uses common and feasible techniques of data gathering such as surveys (described in Section 2.3.5) and field studies (see Section 2.3.7) and is intended to produce generalised theories. This is an important requirement of a validation technique, and appears to recommend GT for use in validation. However, the fact that GT is an inductive, incremental method that is intended to develop a theory or theories over the whole of the lifecycle a research project means that it does not lend itself well to use at one stage of a project. This alone rules it out for use in the composite programme upon which this research project is based.

2.3.7 Field Studies

Field studies are a form of experiment that is undertaken in a natural situation rather than in the contrived, controlled environment of a laboratory. As such, they combine some of the features of a 'pure' scientific method with those of methods from the interpretivist paradigm. This would imply a balance of objective and subjective attributes, with a moderate degree of control by the researcher (Avison 1990). In a field study there will tend to be less manipulation of the dependent variables than would be the case with a laboratory experiment, with the control aspect concentrating on the measurement of data in terms of the dependent variables. Field studies have been shown to be suitable for developing and testing research hypotheses, but Gable (1994) points out that the method has limitations in this application. Technically, as described in such literature, a field study involves *in situ* observation of a process as it happens (e.g. Thomke and Fujimoto 2000). In such examples it is somewhat difficult to differentiate between a field study and a case study. However, it is possible to envisage a type of field study in which the researcher gains data from the participants in a process after it has taken place, perhaps after extra information has been given to the participants.

2.4 The Role of the Researcher

The research design cannot be finalised without considering the role of the researcher in the research process. This role must be compatible with the research paradigm and the chosen research methods. Broadly, the roles that a researcher can play can be placed into one of three categories, the external role, the action research role and the participative role:

2.4.1 The External Observer Role

This is a role in which the researcher sets up the framework for the research, defines the research objectives and collects and analyses data relevant to the research, but has a minimum degree of influence on the research domain. This role usually implies the application of a combination of research methods (such as experiments and surveys) from

an essentially non-interventionist standpoint. A feature of the external research role is that there is little need for the direct involvement of the researcher (such as in latitudinal studies). This is possible where the data to be collected is capable of being analysed and is sufficiently well structured to allow the use of questionnaires. The advantage of such a role for the researcher is that an external observer will maintain a detached, neutral and objective perspective of the data. This is desirable in domains that are prone to subjective interpretation of data, so the external role is most suitable for this research.

2.4.2 The Action Research Role

This role has its roots in behavioural science and was extended in the field of social science to include capture more of the social and psychological factors and to facilitate the interaction between the agents in the research process and the research domain. The action researcher interacts directly with the subjects of the research and is active in defining and solving problems in the research domain (Argyris and Schon 1989). Equally, the researcher will facilitate the involvement of the research subjects (e.g. domain experts) in the research process (Stringer and Barnes 1998). The action researcher is therefore a member of a research/domain expert team which will trade data and experience from the domain in return for theories and knowledge which are derived from the research findings in order to change perceptions and improve processes (Galliers 1992). Weaknesses of this role have been identified, in that the direct involvement of the researcher may lack the objectivity of the external role (e.g. Benbasat 1987).

2.4.3 The Participative Researcher Role

The participative role implies that the observer will be actively involved in the situation that is being studied, but makes a conscious attempt not to influence the process. This is an obvious attempt to combine some of the attributes of close involvement (as would be the case with an action researcher based on a case study) with the objectivity of remote data analysis (as would be the case with a survey). It may be pointed out, however, that any degree of close participation on the part of the researcher is bound to influence the research domain, and for this reason the participative role may be regarded as a variety of the action research role. While the choice of an appropriate research role for a given project is obviously important, it goes without saying that a researcher may find it necessary to adopt more than one of the roles at different times during a research project. For this research, which uses a latitudinal study of industry practice, the most appropriate role for the researcher will be as an outside observer.

2.5 Research Questions and Hypotheses

Having chosen a valid set of research methods and an appropriate role for the researcher, it is necessary to define a set of research questions. Research questions stimulate the

formulation of a research hypothesis by identifying an area of incomplete knowledge in the research domain. A research question may arise from the researcher's interest in an area about which knowledge is incomplete. This question may be theoretical, or it may derive from personal observation, experience or even intuition. The aim of a research question is to '...couch the problem in a context that provides purpose to the question' (Mason and Bramble 1989). The questions behind the present research are derived from the experience of the researcher and will form the basis of set of research hypotheses. After these hypotheses are tested they will form the basis of a proposed strategic linking framework which is capable of being validated. It is important to note that hypotheses can be tentative statements based on subjective concepts such as human experience or intuition. A suitable definition of the term hypothesis is therefore:

(A) proposition made as a basis for reasoning, without assumption of its truth; (a) supposition made as a starting pointing point for further investigation from known facts.

(The Concise Oxford Dictionary 1996)

Before a set of hypotheses can be formed for this research, it is important to recognise the two types of hypotheses (statistical and empirical) that may be used in the research:

2.5.1 Statistical Hypotheses

Statistical hypotheses are intended for application in a quantitative area, in which the researcher seeks to measure directly the effect on the chosen variables of behaviour in the research domain. A null hypothesis is a particular kind of statistical hypothesis that assumes that such behaviour will have no effect or that there is no difference between variable. Statistical hypotheses are used regularly to support the objectivist research paradigm. Research in the objectivist paradigm often applies positivist methods (which are derived from the natural sciences) to the material in a human-centred or social research domain. In effect, the objectivist researcher treats the social world as if it were the natural, scientific world. This is unlikely to be a valid approach to this research.

2.5.2 Empirical Hypotheses

This type is based on a substantive hypothesis (i.e. it is expressed verbally) but is tested in such a way that statistically meaningful results may be derived, usually by observation in a real-world situation or by a direct comparison with other results. Empirical hypotheses are the most common way of carrying out primary research in the business and IS/IT domains, particularly where the research seeks to establish practice in a real world application or to relate academic theory to industrial practice. The nature of the literature upon which the research is based (i.e. narrative descriptions and case studies of strategic IS/IT applications) and the chosen medium of primary research (i.e. survey by

questionnaire) means that empirical hypotheses are considered to be the most suitable for use in this research project. To be meaningful to the research, the hypotheses must be subjected to proof as in some ways, they represent only belief. Ultimately, every research project in a domain in which the data is open to interpretation is, by its very nature, subjective. The domain of this research contains a lot of material of a subjective nature, and therefore which is in itself based on assumptions, both explicit and implicit. The subjective approach attempts to prove hypotheses by subjective means, and regards subjective statements (e.g. opinions and experiences) as valid proof of hypotheses. This approach to hypothetical reasoning fits the research objectives, and empirical hypotheses will therefore be incorporated in the research design. The results of testing the hypotheses will be a set of beliefs that can form the basis of a proposal – in this case the proposed method of linking the business strategy and strategic systems development processes. In order to be accepted, however, the beliefs must be generalised or shown to apply in a sufficient number of cases to make knowledge of them generally applicable and therefore useful. This relies on validation, which is described in the next section.

2.6 Research Validation

The knowledge that is provided by the literature survey and by the examination of the research hypotheses will allow a strategic linking method to be designed and proposed. The proposed strategic linking method, which was developed from information gained during the literature search) will be refined using information gained from a sample of companies in the survey. If, however, the proposal is to be of value to the academic community or to IT practitioners it must be capable of being validated or generalised so that it is of more than local and immediate use. Validation of the proposal can be achieved by one of the following techniques:

2.6.1 Empirical Observation

One way of validating the proposed framework would be to use it to support a ‘real world’ strategic system development project, observe it and document it by using the case study approach (see Section 2.3.2) or action research (described in Section 2.3.3). This approach is called empirical observation (e.g. Jordan 1998, Galor and Tsiddon 1996) and its use is effectively a type of experiment that can give very reliable results in a tightly bounded domain. In an application with the scope and scale of the development of a strategic system, however, the technique has enormous resource implications that will preclude its use in this research.

2.6.2 Field Study

It has been mentioned in Section 3.7 that a field study could involve retrospective interviews with the direct participants in a past activity or process. This approach, which

has more in common with a survey than with a case study which may be termed a ‘quasi-field study’, and is quite suited to comparative analysis. For instance, this type of field study has been used for comparing the results of actual sales with theoretical results that may have been gained using an alternative forecasting method (Lawrence *et al* 2000). A quasi-field study (based on interviews with a selected sample of the original population) will be used to validate the outcomes of the research by extending the survey findings and by confirming the value of the proposed model.

2.7 The Research Design

Having examined the range of available research methods and identified the role of the researcher, it is now possible to evaluate the available methods, to define a set of activities or stages to make up the research project, and to select the methods that are most suitable for the project. In effect, this produces the overall research design. The main stages of the research are described in the following section, and the selection of the appropriate research methods is discussed.

2.7.1 Stage 1 - Domain Investigation

The theme of the research will be developed by using a literature search in the three domains of the research as identified in Chapter 1 (i.e. strategic IS/IT applications, business strategy and strategic frameworks). This part of the research will include an examination and definition of the properties of strategic systems and will encompass a number of case studies of strategic IS/IT applications from the literature. This will help to formalise the researcher’s prior knowledge in the areas of the key components of the linkage between business strategy and IS/IT applications (see Chapters 1, 7, 8, 9 and 10) and will form the basis of the research questions and hypotheses that are examined at the next stage.

2.7.2 Stage 2 - Hypothesis Formulation and Examination

The hypotheses produced from the researcher’s prior experience (see Chapter 1) and following the literature search referred to in Section 2.7.1 (see Chapter 6) are examined by conducting a survey of industrial practice using a questionnaire (also described in Chapter 6). It was decided to use a postal survey (as opposed to a field study or interviews) as the method offered the best opportunity to approach a broad sample of organisations. Although it was chosen as the best method, it cannot be said that a survey is without problems when used for this purpose, largely because the nature of the research domain (strategic applications of IS/IT) is extremely sensitive. The process of choosing the sample, the problems associated with gaining an adequate response to the survey and the steps that were taken to ensure anonymity are discussed in Chapter 6. The results of the survey are used to explore the hypotheses described in Section 6.2. In particular,

hypothesis H2 will be examined in detail. This hypothesis postulates that four of the identified components of the strategic linking process (i.e. strategic positioning, strategic vision, strategic flexibility and strategic alignment) are of significant importance to practitioners in the strategic IS/IT domain and that a fifth component (i.e. value chain integration) is of less importance. Also, the results of the survey are vital in informing the development of the proposed framework or method for linking business strategy to the development of strategic IS/IT applications.

2.7.3 Stage 3 - Analysis of Strategic Components

The four components of the strategic linking process that were derived from the researcher's experience are formalised during the literature search that is carried out at Stage 1 and are included in the hypotheses that are examined in the survey of industrial practice that forms Stage 2 of the research. The survey shows (among other things) that the first four components (i.e. strategic positioning, strategic vision, strategic flexibility and strategic alignment) are considered to be important aspects of the process that links business strategy to the development of strategic IS/IT applications. The fifth component (i.e. value chain integration) is found to be significantly less important to the practitioners. This fact indicates that the first four components are worthy of further study, and so they are analysed individually and in detail in Stage 3 of the research (see Chapters 7, 8, 9 and 10) by using a further literature search.

At this stage it is necessary to understand more about the components, to identify some viable techniques that can support their development and to assess the likely suitability of the techniques in practice. A variant of the feature analysis technique is used for this. The selected techniques are combined to form the basis of the proposed strategic linking method, which is the subject of the next stage of the research.

2.7.4 Stage 4 - Development of the Proposed Method

The proposed method for improving the linkage between a business strategy and the strategic systems development process is formulated by using a literature search into the way similar models, frameworks or methods are constructed. This is the most fundamental contribution of the research. However, before it can be assumed that the proposed method can be 'generalised' or has potential for use in 'real world' applications, it must be validated. This is the subject of the next stage of the research, and is described in Chapter 11.

2.7.5 Stage 5 - Validation of the Proposed Method

The validation stage is particularly important to the project, as without it, it will not be possible to have confidence in the major contribution of the research. At first sight, it

appears that the most obvious method would be to try out the method in an industrial situation, using action research or the case study method. However, this is not advisable, from several points of view. First, the large scale of most strategic system development projects would probably necessitate restricting the validation exercise to a single company for practical reasons. This conflicts with the principle of generalisation, which indicates that to be useful (and, perhaps, a valid contribution to the 'body of knowledge') there must be reasonable grounds for believing that the proposal will valid in more than one case. Second, it is clear from the literature search that the duration of some strategic systems projects must be measured in years rather than months and in some cases may even be 'open ended'. Neither of these situations would be compatible with a single stage of a finite research project such as this. Third, it cannot be assumed that a suitable subject project would be available 'at the right time' or, indeed, that the stakeholders would entrust the likely success of their project to an untried method by way of experiment! Finally, it is not the intention of the research to develop a fully practicable linking method, as the development, application and documentation of such a method would be beyond the scope of this research.

Similarly, it was believed at first that grounded theory (GT) was an appropriate method for validating the proposed model, as its approach to fact-finding and data organisation has features that would suit the present research. However, a major problem arose in practice, as it was found that the GT process (being inductive and incremental in its application) is not really suitable for use in a single stage of a research project. It therefore is felt that the overall GT approach does not fit well with the composite research method that was chosen for this research. However, the ways in which the fact-finding activities are structured and the data coding is organised have much to offer to the research project. It was therefore decided to use a quasi-field study (see Section 2.3.7) that has some of the required features of the GT approach for validating the proposed strategic linking method.

These factors suggest that a type of survey or field study would offer the best potential in the application. It was apparent that the validation exercise would require more interaction with the participants than could be offered by a survey, and that the timing factor would rule out a 'true' field study based on observation. It was therefore decided to use a 'quasi-field study' using structured interviews with a sample of the contributors to the original survey to elicit their experiences of the development of their strategic systems and to assess their opinions of the likely value of the proposed method in practice. Their responses allow the researcher put forward a generally applicable theory about the use of the method that makes a significant contribution to the body of knowledge in the area. It

is not the intention of the research to produce a full methodology with detailed documentation, but to put forward a theory about a method and to make suggestions for its extension by future research. This stage is described in Chapter 12.

Stage	Activity	Method (s)	Outcome(s)
1	Domain investigation	Literature search	Identification of key issues, Definition of strategic IS/IT, understanding of linking process, Identification of strategic components of linking process
2	Hypothesis formulation & examination	Survey, building on literature search	Formulated research questions & hypotheses, based on identified strategic linking components, Examined/tested of hypotheses based on industrial practice
3	Analysis of strategic components	Literature search, feature analysis	Selection of techniques to support identified strategic components
4	Development of linking method	Literature search	Proposed strategic linking method
5	Validation of proposed method	Field study	Generalisation regarding validity of proposed strategic linking method in practice, Proposals for further research and development of strategic linking method in practice

Figure 2.3 Plan of the Research Design

2.8 Summary

In this chapter the influential research elements are discussed and an appropriate programme for the research is described (see Figure 2.3). This research design has five stages. The chosen research methods for these stages are as follows: first, a literature search carried out into the research domains (see Chapters 3, 4 and 5) that identifies the existence of five components of the linkage between a business strategy and the development of strategic IS/IT applications. Second, a set of hypotheses is framed that

postulates that four of the components of the linkage are important and one is not. These hypotheses are examined by a survey of industrial practice (see Chapter 6). In the third stage of the research the components of the linkage are examined in detail, and techniques are suggested to support their development (see Chapters 7, 8, 9 and 10). In the fourth stage a method for supporting the process of strategic linkage is proposed (see Chapter 11). In the fifth and final stage of the research a quasi-field study is carried out by interviewing a small sample of the original survey population, which serves to validate the proposed method in the opinion of the participants (see Chapter 12). The research begins with an examination of the three research domains and the first of these domains, the nature of the strategic application of information systems and information technology, is explored in the next chapter.

Chapter 3

The Nature of Strategic Systems

The research begins with an examination of the concept of strategic systems and the importance of such systems to businesses. This has three objectives: first, to validate the concept of strategic IS/IT applications, second, to find what makes such applications strategic and third to examine the different views of strategic systems from the literature. The literature is rich and varied. IS/IT applications have been cited as causing or enabling a wide range of successful business activities and examples of commercial success have been attributed directly to the use of IS/IT in support of business strategy (e.g. Willcocks 1992, Krcmar and Lucas 1991, Fredericks and Venkatraman 1988). These IS/IT applications are both numerous and diverse, and have been described as important parts of the business strategies of some of the world's most successful companies. Examples are found in banking and financial services (Brady and Targett 1995, Broadbent and Weill 1991, Clemons 1990a), retailing (Loebbecke *et al.* 1996), medicine and pharmaceuticals (Altman 1997, Clemons and Row 1991), air transport (Hopper 1990, Copeland and McKenney 1988) and distribution (Senn 1992). The first stage of the research is to carry out a literature search to establish what material is available. An initial survey indicated that the literature on strategic IS/IT applications could be broadly divided into two categories:

- **Case studies**, which describe the business context and features of the system, usually without attempting an in-depth analysis. There are a relatively small number of these case studies, but the scenarios are described in detail and several of the cases are reported repeatedly, allowing a considerable depth of examination to be made. This category is used to validate the concept of strategic systems;
- **Analytical reports** which are mainly contained in journal papers and text books and which describe the examples of strategic IS/IT use briefly from a variety of perspectives and seek to analyse the systems in terms of their success and impact on the business. Many more examples of strategic applications are described in this category, but the information about the individual systems is less detailed. This category is therefore used to determine the nature of strategic IS/IT applications and to examine the different views of the subject.

A list of the cases that were reviewed and a brief description and citation of each is given in Appendix A. The literature search is structured as follows: first, an analysis is carried out on a sample of the well-described strategic IS/IT case studies to establish whether such systems match the accepted concepts of business strategy. Second, a less detailed examination of the second category of the literature is carried out to discover the various definitions of the term strategic in relation to IS/IT.

3.1 Detailed Analysis of the Cases of Strategic IS/IT Applications

The first stage is to analyse a sample of the case studies from the first category of the literature. This initial review seeks to determine the strategic nature of a limited number of widely published case studies of strategic IS/IT applications to which a considerable degree of business success has been attributed. This is done by comparing the cases with a commonly accepted strategic framework (Eardley *et al.* 1996), namely Porter's industry competition analysis (ICA) model (Porter and Millar 1985). The framework identifies forces which an organisation seeks to exploit (or to which it responds) and which create the potential to carry out 'strategic manoeuvres' which are enacted by using IS/IT mechanisms (see Figure 3.1).

Force	Potential	Mechanism
1. Competition among rivals.	Change the basis of competition.	Compete or collaborate.
2. Mobility of customers.	'Lock-in' to firm.	Differentiate or create switch costs.
3. Supplier bargaining.	Reduce bargaining.	Erode or share power.
4. Substitute products or services.	Innovate.	Develop new product or add value to existing product.
5. New entrants to the market.	Create barriers to entry.	Demolish or erect own.

Figure 3.1 Porter's Framework Applied to Strategic IS/IT (after Earl 1989)

Porter's framework implies that management will seek to implement policies that position the firm in its environment by balancing five market forces: competitors, customers, suppliers, substitute products and new entrants to the market or industry. The ICA framework is chosen because it is 'the most fundamental of the strategic frameworks' (King *et al.* 1988) and is also a valid benchmark against which to evaluate the success of strategic information systems. It is a 'convenient and useful tool for communicating the potential of IT to managers and practitioners' (Boon 1988). It also has a sound record of use in the analysis of strategy. An early application of the framework by Parsons assessed

the strategic importance of IT applications (Parsons 1983a), and was used to evaluate the strategic importance of inter-organisational IS (Cash 1987). It also formed a basis for work that explored the links between corporate strategy and IT (Bacos and Treacy 1986), which examined the strategic risks to IS development (Vitale 1986), and is used in a study of the banking industry (Liang and Tan 1994).

A comparison with Porter's ICA framework makes it possible to draw conclusions about the strategic nature of the cases in several ways. First, a close compliance with the framework will indicate that the systems may be termed 'strategic' with some justification. Second, more detailed facts may be exposed which may cast light upon the nature of the systems and the motivation behind their development. The following findings are produced by the analysis:

- Six of the eight cases display evidence of the characteristic strategy that Porter termed 'changing the basis of competition'. All the systems are cited as the direct cause of the relative success of the companies that operated them. In the case of direct competition between companies for a defined market (for instance American Airlines and United Airlines) it is apparent that one of the companies had achieved a measure of competitive advantage over the other. In the cases of collaboration between companies (for instance PNB and Merrill Lynch) the degree of success is more difficult to define, although it is notable that CMA was pre-eminent in its market for five years and MAC did absorb most of the rival ATM systems in the Pittsburgh area. In all of these cases there is clear evidence of strategic intent in the use of the systems but not necessarily in their development, which appear to be *ad hoc* in nature. This may be a result of the piecemeal identification of business opportunities, or it may be a characteristic of the interaction between the business strategy and information system development processes which has been called '*bricolage*' (Ciborra 1994);
- Four of the cases exhibit signs of the strategy of reducing customer mobility by an apparent attempt to lock-in customers. Attempts were made to exercise such power over the customer in several ways. AHSC and McKesson used the strategy of sharing the technology with the customer to create switching costs to 'lock in' the customer, whereas American Airways secured the loyalty of air travellers by using Sabre to log their flights and to provide a frequent flier bonus as an incentive. Merrill Lynch used the range of financial services that are offered by CMA to make it unnecessary for customers to open specialised accounts with competitors;
- None of the chosen cases exhibit the related strategy of responding to suppliers' bargaining power by sharing or eroding that power. This may be due to the small size of the sample or it may be due to the era in which the systems were developed. There

are several more recent instances of this characteristic being displayed by strategic systems, but these are not yet well reported;

- As the literature about the cases fails to describe the market situation which existed before the development of the systems, it is not possible to assess how many of the systems were part of a strategy of response to competitive products or services. Neither is it clear how many firms had tried to introduce competitive systems and failed, since these cases go unreported. There is direct evidence that four out of the eight companies made 'value-adding' enhancements to the systems' functions in order to stave off the threat of substitution. It is clear from the cases that these enhancements are strategic moves and are independent of any technology-led improvements which may have been made to the systems;
- Three of the eight cases show evidence of the use of the system to create a barrier to other companies entering the market. In all of these cases the barrier is related to the scale of the system and to the first mover effect rather than the difficulty of development. In fact few of the systems used more sophisticated technology than the average transaction processing system of that era. The proportion of the systems that exhibit this characteristic is less than would be expected. Two of the cases (Federal Express and PNB) show clear evidence of the use of their systems to demolish barriers to entry erected by competitors with first-mover advantage (Trimble 1993). PNB applied the classic strategy of demolishing barriers by using a shared ATM system to enter the market and to gain market share. The cases of American Airlines and Citicorp also exhibit this characteristic quite strongly.

3.2 Findings of the Review

The case studies clearly describe strategic IS/IT applications, as they show significant compliance with Porter's ICA framework. There is clear evidence of defining strategic moves, identifying strategic potential and suggesting IS/IT mechanisms. All of the cases show evidence of possessing at least one dimension of the framework and three out of the eight comply with three dimensions or more (see Figure 3.2). It could be argued that Porter's framework is derived from practice, and since its derivation may have been influenced by some of the cases in the survey (Eardley *et al.* 1996) a good mapping between the framework and reality would be expected. However, since it is accepted that Porter's work is valid for defining and describing strategies, it is held that the systems which comply with it (and therefore this type of system in general) are valid cases of strategic systems (Morrison and Roth 1993). The concept of strategic IS/IT applications is therefore held to be valid.

Several factors are identified that may complicate the formation of an acceptable definition, which include the following:

- All the systems are large, complex, and reach into many areas of the businesses that use them. There is no doubt that some parts of these systems impart a strategic advantage to the firms, but to state that an information system as a whole is strategic just because it covers a wide range of business applications would seem to go against both Porter's framework and common sense. It would, therefore, be more accurate to state that the majority of the systems in these cases are information systems with strategic dimensions. To do otherwise would confuse importance with strategic value, and it has been pointed out that a strategic information system would not be 'a thing apart from the organisation's management information systems' (Emery 1990).

Company	System	1	2	3	4	5
American Airlines	Sabre	change basis	incentive	-	added value	-
United Airlines	Apollo	-	switching costs	-		-
American Hospital Supply	ASAP	change basis	switching costs	-	-	erect
Federal Express	COSMOS	change basis	-	-	added value	demolish
McKesson	Economost	change basis	switching costs	-	-	-
Citicorp	GTN	-	switching costs	-	-	-
Merrill Lynch	CMA	change basis	range of services	-	-	-
PNB	MAC	change basis	-	-	-	demolish

Key to ICA forces:

1. Competition among rivals.
2. Mobility of customers.

4. Substitute products or services.

3. Supplier bargaining power.

5. New entrants to the market.

Figure 3.2 **Summary of Strategic Moves in Response to Forces**

- The definition of the term strategic system is not sufficiently precise. Just as it is possible to confuse the terms 'strategic' and 'important' when referring to systems, so it is easy to refer to a system as strategic when what is meant is 'successful'. It has even been pointed out that to classify information systems as strategic and non-strategic is meaningless, because the term does not describe a type of system, but the effect that the use of the system has upon the business (Senn 1992);
- The majority of the cases in the study do not appear to have been planned from their inception, as Ciborra (1991) and others have suggested, to have the strategic potential that they were later claimed to exhibit. The example which best illustrates this is American Airlines's Sabre, which was conceived in 1959 as an internal data processing system. Relatively few of the enhancements that were to give the system its strategic value to the company over the next 16 years appear to have been planned in any formal way. Sabre developed as a result of piecemeal enhancements in response to changes in the air travel market such as the breakdown of a collaborative industry-wide booking system. The system can only be judged as a strategic success with the value of hindsight (King *et al.* 1988).

A number of common perceptions or views of the strategic IS/IT phenomenon are identified, and these are categorised and described in the next section.

3.3 Views of Strategic Systems

This part of the chapter involves an analysis of the second category of the literature to determine the different views of strategic systems. Although examples of such systems are common in the literature, there are few attempts to classify such systems or to place them into categories (e.g. Sutherland 1991). IS/IT applications have been said to play a strategic role in organisations in a variety of contexts (e.g. Strassman 1990) and some attempt at classification should help make sense of the body of empirical literature that has grown up around strategic systems, some of which may be merely anecdotal. The following section places the views of strategic IS/IT applications into categories, based upon some attribute of the application or of the technology.

3.3.1 The Intrinsic View

This definition is based on the assumption that there are intrinsic factors about IS/IT itself that make it essentially strategic at the industry level, the firm level or the level of the firm's strategy (Parsons 1983b). This embraces the so-called 'epochal' view of IT and centres on the fact that the role of IT is changing in a way that raises its strategic importance. One of the first thorough attempts to define the concept of the intrinsically strategic role of IS/IT was by Earl (1989), who identifies and summarises nine trends that

suggest a strategic case for IS/IT. The items of influence that form this definition may be grouped for convenience as follows:

- **Economic factors** that imply that a high level of expenditure on IS/IT gives the technology some strategic importance to that organisation, and that 'above average spending on IT can help secure sector leadership in profitability performance' - the so-called IT multiplier effect (Earl 1989). Where firms' IT budgets are growing at between 20% and 40% *per annum* and up to 50% of some organisations' capital expenditure is devoted to IT, it is compelling to reason that IS/IT is, by definition, strategic to these organisations. The economic environment therefore imbues IS/IT with a strategic importance and creates a demand for IS/IT to be used strategically. Factors such as deregulation (Vietor 1994), globalisation (Ives *et al.* 1993) and price/time competition (Battacharia and Jina 1997) lend support to this contention;
- **Business factors** relate to the use of IS/IT in support of an organisation's strategy or business processes. This includes the extent to which the firm relies on IS or IT to carry on its everyday business activities and the impact which IS/IT has or may have upon the firm's methods of doing business. These factors are, of course, those that McFarlan and McKenney (1983) use in the strategic grid technique, which is one of the most common techniques of applications portfolio management. Also IS/IT can be strategic in nature because of its ability to enact a chosen business strategy, indicating its use in gaining competitive advantage, improving productivity and performance, developing new ways of assisting in the development of business ideas (Earl 1989);
- **Management factors** that suggest that IT affects all functions and levels of management and strategic managers cannot afford not to become involved in the strategic decisions affecting IS/IT in their organisations (e.g. outsourcing and technology infrastructure). This implies that IT is an executive management issue, as is indicated by the degree of support by top management for IT and the level at which IT is represented in organisations. The number of stakeholders in an IS/IT application that can be identified also indicates its strategic nature, as manufacturers, governments and consumers become increasingly involved in IS/IT applications (Earl 1989).

Earl's classification may be criticised as being too broad to use in defining a strategic IS/IT application. For instance, the framework does not focus on individual applications but works at a firm or industry level. Indeed, it is probably not intended to define IS/IT applications as strategic, but to raise executives' awareness of the strategic importance of IS/IT issues and raising the profile of IS/IT in organisations.

3.3.2 The Extrinsic View

Earl's view of the strategic nature of systems is based on internal factors applying to IT in general. A counter view implies that a strategic system is based on the context of the

system and the way the system functions within its environment and that strategic systems 'may be no different from traditional IS/IT systems' except in their relations to external factors (Peppard 1993 p.15). This is similar to other views that maintain that any system can be strategic if it is sufficiently important to the organisation (Andreu *et al.* 1991) or if it happens to lead to business success (Avison *et al.* 1996). According to Peppard (1993), any strategic IS/IT application has to have, by definition, some or all of the following features:

- An external focus, on stakeholders outside the organisation rather than a focus on internal operatives;
- Differentiation or adding value to products or services rather than focusing solely on cost reduction or process efficiency;
- Sharing the benefits within the organisation and with external business partners (including competitors) rather than aiming only for geographically or functionally localised benefits;
- A solution-oriented customer-focused approach based on the delivery of value rather than concentrating on solving internal operational problems;
- Business-driven innovation, rather than an emphasis on the latest technology;
- Incremental development often is a process of trial and error rather than the long-term development of total systems;
- Exploitation of the information in a way which is intended to develop the business (e.g. by market segmentation) rather than support the administrative processes.

These factors could be seen to mean that any type of IS/IT application in any functional area can be considered to be strategic in nature, providing it satisfies the above requirements. This seems to be closer to a true definition of the term strategic in relation to IS/IT, but other authors appear to imply that only certain types of system may satisfy the criteria, leading to a functional view of strategic IS/IT.

3.3.3 The Functional View

This category of strategic IS/IT application is based on the premise that certain areas of a business are of particular importance, that certain business processes are vital to the achievement of its strategic objectives and that these strategic functions and processes will, when computerised, be strategic IS/IT applications. This definition is probably based on an empirical view of the large number of strategic IS/IT applications that are cited in the literature and produces a very prescriptive view of the phenomenon (Krcmar and Lucas 1991). Schuman and Hohe (1988) group functional strategic systems types into the following categories:

- Ordering systems that link the organisation with customers' or suppliers' supply chain systems;

- Value-adding IT services (e.g. systems for operation in the acquisition or after-sales phases of the business life cycle);
- Systems for new product or service development;
- IT-based distribution channels for delivering products or services;
- Electronic commerce and market support systems.

Krcmar (1986) divides such systems into two categories. First, those which are evolutionary, in that they are developments of an existing functional IS/IT application to enable it to be used strategically and second, those which are revolutionary, in that they are intended to support a new business function or to exploit an innovative business idea. In a later work a third category of functional application is proposed, that is systems which are intended to interface and integrate existing (presumably non-strategic) applications in a way which gives strategic benefits to the organisation (Tan *et al.* 1995).

Other research has identified strategic IS/IT applications in the specific areas of customer service (Ives and Learmonth 1984), after-sales service (Ives and Vitale 1988) and product/service pricing (Beath and Ives 1986). In a survey of thirty US companies that were judged to have developed successful strategic systems twenty-two are identified as functional systems. The main problem with this definition of strategic system is that it is overly prescriptive. It is obvious that the true importance of any business function relates only to the structures, processes, objectives and distinctive competence of specific organisations. It is not clear from the definition whether types of organisation that do not 'map onto' this (or any other) list of functions, such as hospitals and universities, can operate strategic systems. One effect of this definition is that it implies a strong element of competition, as all the firms in a market sector would seek to develop and operate similar systems. This leads to another definition of strategic system that can be used to define the phenomenon.

3.3.4 The Competitive View

This definition holds that systems that give firms a degree of competitive advantage over their rivals are essentially strategic, to the extent that the terms 'strategic' and 'competitive' are sometimes regarded as being synonymous.

Across all industries there are various examples of what are frequently called strategic information systems (SIS), or systems that lead to a competitive advantage for the organisations which use them.

(Senn 1992, p.7)

This implies that there is something about the nature of an organisation's competitive strategy that links it to the actions and strategies of other players in its market sector, and according to proponents of this view,

A Strategic Information System (SIS) is generally considered to be an application that allows the developer to gain an advantage over the competition, or at least to keep up with competitors.

(Krcmar and Lucas 1991, p.137)

It is possible to identify two main categories of strategic IS/IT application which fit into the competitive category, and these may be grouped according to the business frameworks which best describe them:

- **Industry rivalry systems** are intended to further business strategies in which the organisation will use IT to influence its competitive environment and will, in turn, respond to the actions of rivals who are also using IT strategically. The major influence upon this type of application is the industry competition model (Porter 1980). It has been demonstrated that many of the strategic systems that are regarded as 'classics' show a high degree of compatibility with this model (Avison *et al.* 1996, Boon 1988). Systems in this category include those which seek to counter the actions of rivals, controlling the bargaining power of customers and suppliers, using IT to create or to support of innovative products or services and to erect or to demolish barriers to entry to the industry (Schilling 1998);
- **Value chain systems** having an internal perspective. The model was developed as a 'systematic method for examining all the activities which a firm performs and how they interact as a basis for analysing and supporting the sources of competitive advantage' (Porter 1985). The strategy behind the model is to 'maximise the value-adding activities while minimising those that do not add value to the product in the eyes of the customer' (Callon 1996). Examples of the strategic use of IS/IT can be identified in support of primary activities (e.g. logistics systems, inventory management systems) and secondary activities (e.g. financial and human resource management systems). Many value chain systems in this category can scarcely be considered to be strategic in their own right, but acquire a strategic importance when combined into integrated systems spanning the whole value chain (Rich and Hines 1997).

IT 'has become a prominent and pervasive tool within most, if not all of the Value Chain' (Callon 1996). Inter organisational IS (Johnson and Vitale 1988) are strategic systems that exploit the idea of 'webs of value'. This may be done by extending the value chain backward or forward to integrate with customers' own value chain systems (Normann and Ramirez 1993) or laterally to share technology with business allies (Gooding 1988). It is possible to identify many examples of IS/IT that use value chain systems to exploit or to

enact features of the competition model by sharing technology with organisations up and down the supply chain (e.g. Loebbecke *et al.* 1996, Altman 1997).

3.3.5 The Planning View

Some IS/IT applications have a particular place in the strategic information systems plan (SISP) by virtue of their importance or priority to the organisation (Ernst *et al.* 1994). SISP (i.e. the process itself) is frequently regarded as a central resource for the achievement of business success, a way of creating competitive advantage and often the initiator for new services and products (Flynn and Arce 1995). The term strategic in this context means critical, in that IT applications that have been identified as a priority by one of the 'widely used SISP approaches such as BSP, Summit-S or Information Engineering' (Flynn and Arce 1995) gain strategic importance by focusing management effort and organisational resources upon them. In this view any application or infrastructure system could be a strategic system if it is so identified by management. In a study of electronic data interchange (EDI) systems and comparative advantage it is suggested that, 'strategic information systems planning (SISP) is a suitable superstructure within which the EDI implementation may be considered from an appropriate strategic, as opposed to tactical, perspective' (Galliers *et al.* 1995, p.149). It is contended that this category does not define a strategic system satisfactorily, as it can subsume systems that fit more naturally into many of the other categories (O'Connor 1993), and is not therefore within the domain of this research.

3.4 Applications of Strategic IS/IT

The examination of the literature shows that the nature of the applications of strategic systems is as diverse as the different views of strategy. It is apparent that strategic IS/IT applications are developed and used for many purposes, and that they can have many different types of impact on the business. The following beneficial results of the strategic use of IS/IT applications are the most frequently identified in the literature search:

3.4.1 Faster Time to Market

It has long been recognised that a manufacturing company which is able to shorten the design, development and production time for its products is able to secure considerable advantages in terms of market share, trading infrastructures and brand loyalty (Stalk 1989). This is of particular importance in the aeroplane industry, where these activities can take many years to complete. Boeing, the commercial aircraft manufacturer based in Seattle, had enjoyed a world-leading position in the industry until the 1990s, when the European Airbus Industrie consortium began to threaten its market share with government-backed collaborative design-and-build projects (Lane 1997). However, Boeing executives realised that a new generation of airliner was the only valid response to

this threat, and that the strategic use of IT in support of the design-and-build cycle was the best way to bring the first of the new aeroplanes to market as quickly as possible. The result was the Boeing 777, the first aeroplane to be '100% computer based' without the costly production of a prototype (Labich 1996). Similar instances of the use of computer-aided design and manufacture (CAD/CAM) to reduce time to market are noted in the automobile industry (Calabrese 1997).

3.4.2 Rapid Corporate Growth

While manufacturing corporations such as Boeing have used IT to 'downsize' by substituting technology for labour, the retail industry has seen proximity to the customer as a critical success factor. This means that size and geographical spread are important parts of the strategies of supermarkets and retail chains. This has led to some striking examples of successful proliferation strategies based on strategic IS/IT. For example Wal-Mart Stores was originally a small retail chain in the Southern USA with 229 outlets and a marketing strategy based on niche marketing (Porter 1980). Wal-Mart invested an average \$120 million per year in IT and developing systems which provide, 'quality goods...available when and where customers want them...(with) a cost structure which enables competitive pricing' (Stalk *et al.* 1992). This supported a strategy in which rapid inventory replenishment is a centrepiece, some order consignments passing through its computerised warehouses without ever going into storage (Peppard 1993). The result of this strategic development was a growth rate of 25% per year to make Wal-Mart the largest and most profitable retailer in the world.

3.4.3 New Industry Development

The strategic application of IS/IT has been cited as the having enabled whole new industries to be developed. There are numerous examples in the literature of firms that have used the potential of strategic IS/IT applications to produce radical and innovative business ventures. Federal Express could be said to have created the 'overnight delivery industry' by setting up an IT infrastructure that allowed an unprecedented amount of information to be transmitted about parcels in transit (Pitney 1989). This in turn enabled accurate and rapid despatching and tracking of deliveries, leading to Federal making the famous claim, 'Absolutely overnight delivery and we'll tell a customer at any point in the delivery process where the package is, whether it has been delivered and who signed for it'. Federal's service caused a massive structural change and set up huge barriers to entry to the package distribution market. It is reputed to have cost major rival UPS some \$1.4 billion to duplicate the 'guaranteed overnight' capability (Peppard 1993). Similarly, US broker Charles Schwab realised in the 1980s that the existing applications of IT in the low-cost discount brokerage market were limited to cost competition and were easily replicated by rivals, being based largely on telephone dealing and centralised trading

systems (Schonfeld 1998). Schwab's idea was to provide an IT infrastructure and 'public' IS applications called StreetSmart and Telebroker which allow clients to execute their own trades without apparent broker intervention, and the self-execution brokerage industry was born (Serwer 1999). Similar examples of IS/IT providing a strategic role in creating new business areas, new markets and new industries are recorded, as in the cases of the Direct Line telephone-based motor insurance operation, American Airlines' Sabre system (Hopper 1990) and Merrill Lynch's personal Cash Management Account system (Boon 1988). In two of the above cases the IS/IT applications have caused radical changes in the organisations' structure. Both the IS/IT functions of American Airlines and Federal Express being launched as separate divisional 'profit centres' which are highly lucrative enterprises in their own right. Sabre Technologies achieved a turnover of \$550 million in 1991 and its IS handle over 30 million enquiries a day for 740 rival airlines (Button 1995).

3.4.4 Increased Competitive Advantage

A lot of research into the complex linkages between IT and competitive advantage has been done (e.g. Senn 1992, Senker and Senker 1992, Boon 1988, King, Hufnagel and Grover 1988). American Airlines, Merrill Lynch, McKesson's Pharmaceuticals and American Hospital Supply Corporation (later to become Baxter Travenol) have all been cited as having gained a considerable advantage over their rivals by the strategic use of IS/IT (Feeny 1988). Competitive success has been also attributed to IS/IT in the clothing industry (Cookson 1990) and brick production (Bradshaw 1990).

3.4.5 Initiating Strategic Manoeuvres

There are many documented instances of IS/IT having a strategic role in enabling organisations to be proactive in achieving business objectives and carrying out operational manoeuvres that are identified by the firm's strategy. IT has been used by 'first mover', for instance to overcome barriers to entry to a market, such as the installation of automated teller machine (ATM) systems acting as a substitute for retail bank branches at Citicorp (Earl 1989) and to launch innovative new products. IT has also been used as a delivery channel to change the basis of competition in industries as in the case of McKesson Pharmaceuticals (Clemons and Row 1988). The strategy is, however, open to imitation. An obvious implications which may be drawn from the literature are that it is particularly important for first-movers to gain the maximum benefit from their systems as was found in an analysis of IT adoption by US banks (Dos Santos and Peffers 1991). Merrill Lynch's CMA was a radically new financial service (developed from ideas put forward by the Stanford Research Institute) that enabled the firm to capture a 90% share of the market in its first year (Boon 1988).

Clearly, these examples are not discrete. Some of the strategic applications ‘overlap’ in that some constitute first order effects and some are second order effects. For instance ‘faster time to market’ might lead to ‘rapid corporate growth’ and/or ‘increased competitive advantage’ in any given organisation. Nevertheless, such examples are often described as if the strategic system was planned and designed to achieve those specific effects. Since organisations rarely announce in advance that they are going to develop a system to carry out a particular competitive manoeuvre or achieve a particular corporate objective, it is rarely clear whether the successes are intentional.

3.5 A Definition of Strategic Systems

The case for attributing some business success stories to the strategic use of IS/IT is compelling if not entirely convincing. While the long-term commercial and strategic effectiveness of some of these examples of SIS has been questioned (e.g. Eardley *et al.* 1996, Senn 1992, Copeland and McKenney 1988), there can be little doubt that these systems were important determinants of business success for the organisations which operated them. Despite the quantity of literature about these systems and the extent to which their success (or otherwise) has been surveyed and analysed (e.g. Kettinger *et al.* 1994, Segars *et al.* 1994), there has been relatively little research devoted to the way in which the systems were conceived and developed. It may be that these examples are not so much successful examples of strategic systems as normal systems that happened to succeed strategically (Bergeron *et al.* 1991). The difference is not a matter of success but of intent. It is not sufficient to claim after the event (Powell 1993) that normal systems such as transaction processing systems (Andreu *et al.* 1991) were developed to further business strategies and to achieve strategic objectives. It is therefore held that strategic systems should be conceived and developed according to valid frameworks that link some aspects of business strategy and IS/IT development. The following definition of a strategic system is proposed:

A strategic system is an IS/IT application that has a direct linkage to the organisation’s business strategy and that is flexible enough to support the organisation’s various strategic manoeuvres in achieving its long-term business vision.

This definition is important for shaping the remainder of the research and provides a valuable input to the process of developing hypotheses and frameworks.

3.6 Summary

A review of cases of strategic IS/IT applications shows that there is evidence of compliance with a common strategic framework. This, in itself, implies that these are strategic systems, but a firm definition is needed. A number of different views of the

strategic nature of IS/IT in the literature are examined to identify the strategic factors and the types of system that will form the main part of the research, and the applications of strategic IS/IT are identified. It is possible to draw some important conclusions from the literature search into strategic systems. First, the definition of strategic systems seems to vary from one organisation to another, because the concept is relative. Second, the message is that an IS or an IT application can be strategic to a particular organisation if it is integral to or in alignment with the organisation's unique business strategy (Jordan and Tricker 1995). Advanced or leading-edge technology alone appears not to be the determining factor in achieving strategic success in many of the cases. The examples of success in the literature tend to describe the use of adequate technology used to enact visionary business strategy and 'in support of creative and excellent business ideas' (Keen 1988). Strategic systems should therefore support business vision and enable business manoeuvres to take place. It follows that organisations need frameworks, methods and techniques for matching such systems to their strategies in ways that are sufficiently flexible to cope with strategic changes.

The analysis suggests that the most valid definition of a strategic system is one that supports and is in alignment with an organisation's business strategy. The literature fails to describe the frameworks, methods or techniques that are used to develop the well-known examples of strategic systems and to link them to the business strategy of the organisations that develop them. It is therefore necessary to examine practice in industry for such aids to development as may be available and to categorise them so that recommendations may be made for their improved use. To counteract the cultural, geographical and temporal bias of much of the existing literature, a survey is carried out into the development practice and use of strategic IS/IT in UK companies. These are the objectives of the rest of this research. The next chapter examines the domain of business strategy, focusing on the different schools of strategy and various models of the strategy process.

Chapter 4

Business Strategy

This chapter has four main aims. First, to examine the literature on strategy to find out if there are common views of or perspectives on strategy. Second, to review the types of strategy which are described in the literature and to examine the applications and characteristics of these strategies. Third, to examine alternative philosophies or approaches to strategy development and fourth, to identify common models of the strategic planning and development process. This will be used with the researcher's own experiences to choose appropriate research paradigms and methods, and will be instrumental in framing the basic research questions and hypotheses. In addition, the literature search will serve to refine and to confirm (or deny) the researcher's prior beliefs. As a result of prior experience and knowledge of both business strategy and IS/IT development (see Chapter 1), and as a result of the literature search into strategic systems (see Chapter 3), the researcher had developed certain expectations at this stage of the research. These expectations were about the relationship between the two domains of business strategy and the development of strategic IS/IT applications and concerned the belief that the two domains are joined or linked by certain 'strategic factors'.

These expected factors are as follows. First, the strategic IS/IT application should support the business in manoeuvring and responding to forces in its environment. Second, the application should support the business in achieving its aims or desired future states. Third, the application should be long-lived and able to cope with internal and external changes in the business. Fourth, the application should be developed and operated in an environment that promotes cohesion or alignment between the organisation's strategies and infrastructures. Finally, the application should promote integration through the organisation's value chain.

However, the domain of business strategy is a complex area about which much has been written from a variety of perspectives, and before these expectations can be taken further it is necessary to examine some of these views.

4.1 Views of Strategy

Mintzberg (1994) summarises the many competing definitions of strategy that appear in the literature by placing them into categories that he terms 'the five Ps': strategy as plan, ploy, pattern, position or perspective. It is stressed that these views of strategy are not discrete, as any given example of strategy may be sufficiently broad and flexible to appear in several categories. It is important to examine these concepts as they may influence the

approaches to strategy development, which may in turn influence the types of IS/IT applications which are developed to support the strategies. The views of strategy are as follows:

4.1.1 Strategy as a Plan

In this view, a strategy is a 'consciously intended course of action, a guideline (or set of guidelines) to deal with a situation'. (Mintzberg 1992). The two distinguishing characteristics of this definition are, first, there is an element of purpose in the strategy, (i.e. a strategy has to be intentional) and second, the actions of the strategy are defined in advance of their execution. This category covers many examples of strategies in a variety of fields. Strategy is identified in military 'plans of war ...and individual engagements' (von Clausewitz 1976 p. 177) and game theory, in which strategy is 'a plan which specifies what choices [the players] will make in every possible situation' (von Neumann and Morgenstern 1967 p. 79). The characteristic of a strategy developed according to this view is that it is 'top down' (i.e. driven by the vision of top management) and is long-term and inflexible. There is a direct analogy between the concept of strategy as planning and the practice of strategic information systems planning or SISP (Flynn and Arce 1995).

4.1.2 Strategy as a Ploy

The above definition implies that a strategy is made up of plans that are broad in scope and general in intention. Mintzberg's category of strategy as ploy may be regarded as a subset of the first category, and consists of strategies that have a more specific aim and which may form a part of a programme intended to achieve an objective indirectly (the literal meaning of ploy). Mintzberg points out that many of the classic competitive moves that are described by Porter's industry competition analysis model (Porter 1980) are in fact ploys, and one view of competitive strategy sees competitive bargaining as a conflict-resolution strategy based on ploys (Schelling 1980). Porter's model has been extended to include the use of IT-based mechanisms to put the ploys into effect (Porter and Millar 1985) and some of the classic strategic IS/IT applications exhibit this indirect approach (e.g. Ciborra 1991). This view of strategy emphasises the aspect of flexibility, as ploys may be adopted at shorter notice and changed more frequently than plans, and also includes the concept of 'jockeying for position' in a competitive environment (Porter 1980).

4.1.3 Strategy as a Pattern

Mintzberg points out that a strategy may characterise the regular behaviour of an organisation over a substantial period of time. In this view, the pattern of a strategy may be made up of a series of plans and ploys intended to achieve a specific type of behaviour

in the long term. This pattern may be related to an organisation's underlying culture, and it may be assumed that firms have consistent strategic intentions, some of which are realised (i.e. a successful outcome is achieved) and some of which are unrealised. A prudent organisation will augment its intentional manoeuvres with elements of strategy that are not planned but which are likely to be successful under the current circumstances. This is emergent strategy and is related to the concept of serendipity (i.e. the art of making fortunate finds by chance). The mixture of intended and unintended manoeuvres is pattern and demands consistency, as 'no consistency means no strategy - or at least unrealised strategy' (Mintzberg 1994). The implications of this approach centre on the problems of developing strategic IS/IT applications to support strategies for which no design exists.

4.1.4 Strategy as a Position

It is clear that the views of Porter and Schelling, which imply that an organisation relates to its environment through competition or conflict with its rivals, may be only partially correct. For Hofer and Schendel (1978), strategy is a position that allows a firm to match its internal factors (e.g. resources, structure and technology) to the external context (i.e. its environment) in a more general sense. This refers to the position that a company will adopt in relation to its environment as its product/market domain - where its resources are concentrated and where they may be deployed most efficiently. Such positions may include alternatives to competition, such as collaboration (Simmons *et al.* 1988), and the notion of 'collective strategy' (Astley and Fombrun 1983) involving the formation of strategic alliances (Drago 1997, Howarth 1994) and webs of value (McGee and Prusak 1993). The literature indicates that the positioning approach implies a strategic role for IS/IT in supporting the manoeuvres that allow a strategic position to be sustained.

4.1.5 Strategy as a Perspective

Positional strategies are essentially outward-looking and forward-looking, in that they are based on organisations establishing a knowledge of their competitive environment and enacting strategies that allow them to establish positions in that environment. By contrast, strategies that are defined by perspective are essentially internal and historical in nature, dealing with cultural issues and a corporate ideology which creates a sort of organisational personality, a set of shared concepts which govern the firm's behaviour, and which guide its strategic actions. The German word *weltanschauung* or worldview describes this view of strategy, with the difference that the perspective is a product of the collective organisational mind against which potential strategies are evaluated (Checkland and Davis 1986). This creates a *modus operandi* that produces consistent behaviour over time and which ensures that an organisation's strategic manoeuvres are matched to its resource base and distinctive competencies (Pelham 1999). There are cases in the literature

describing organisations that exhibit strong evidence of strategy as perspective through their strong corporate identity, such as McDonalds, IBM and Hewlett Packard (Mintzberg 1994). In such cases there is a clear role for strategic systems in developing and promulgating the vision that forms and reinforces the organisational identity (Meyer 1992).

4.2 Types of Strategy

Since following these alternative views will result in the development of different types of strategy, it also follows that the strategy type that an organisation adopts will exercise a strong influence on the strategic IS/IT applications that it develops. If some typical strategies can be identified, then the possibility of using a generic framework to link business strategy and strategic IS/IT applications becomes a more realistic exercise. It is therefore important to look at some of the influences upon the strategic process. The development of corporate strategy as a discipline is essentially a post-war phenomenon that is a reaction to previous bureaucratic and entrepreneurial approaches to the direction of organisations (Chandler 1967). Although an organisation's strategy may be regarded as an individual and unique response to environmental stimuli, there are generic strategies and common approaches to strategy development that are accepted within the academic and business communities (Douglas and Dong 1989, Douglas and Rhee 1989). A planned strategy and the pattern of the strategy may be independent of each other. Some planned strategies may go unrealised (i.e. they are abandoned or not enacted for a variety of practical reasons), while some strategies may be developed and applied spontaneously, without plan or preconception (Mintzberg and Quinn 1996). This allows two approaches to strategy development to be labelled as deliberate, where a planned strategy is realised and emergent (Kenyon and Mathur 1993) where a realised strategy is produced without a visible plan. It is probable that most strategies described in the literature occur somewhere on a continuum between these approaches (Johnson and Scholes 1993), which coincides with the following types of strategy (Mintzberg and Waters 1985):

4.2.1 The Entrepreneurial Strategy

An entrepreneurial strategy is based on the direction of the organisation by a single risk taking individual, who does not need to publish a strategic plan or to seek a consensus from those involved in its operation. This entrepreneur may adapt the organisation's policies and programmes to environmental circumstances as and when they occur. Such strategies are often the preserve of small, agile businesses and are often not amenable to support from strategic IS/IT applications unless they are reinforced by a flexible and responsive IS/IT infrastructure. A high degree of cohesion or alignment between the firm's functional strategies is also required, and the entrepreneur must be able to

promulgate his or her vision throughout the organisation. Many world-class organisations such as Virgin and IKEA started out as small businesses using entrepreneurial strategies to achieve rapid success. The critical point comes when the entrepreneurs are successful in communicating their vision throughout the organisation (Bartlett and Ghoshal 1994).

4.2.2 The Imposed Strategy

An imposed strategy is one in which a dominant external influence (e.g. government) determines the organisation's strategic responses. Under such circumstances the organisation's strategic environment is often comparatively stable or is subject to predictable (and perhaps negotiable) step changes. This would seem to place the emphasis on increasing the efficiency of business operations without the need for flexibility or response to environmental change. However, under such conditions the strategic use of IS/IT to influence the position of the firm with regard to its dominant environmental factor and the drive for cohesion between business and IS/IT strategies to maximise IS/IT effectiveness may be over-riding imperatives.

4.2.3 The Ideological Strategy

In some ways this is the opposite of the entrepreneurial strategy and involves an adherence to a set of collective norms and a commonly agreed business culture (i.e. a shared vision) that governs the organisation's actions in response to forces acting in its environment. Again, little need for responsiveness and flexibility in terms of IS applications and IT infrastructures is apparent, as the rate of change will be relatively slow. In this instance the role of corporate ideology in forming the strategy requires the development of systems that support the strategic vision of the organisation (Davis and Davidson 1991) and cohesion between strategies will be an important factor in developing IS/IT applications. Examples of ideological strategies are particularly noticeable where companies are involved in a long-running struggle with a single competitor, as in the case of Komatsu and Caterpillar (Bartlett and Ghoshal 1994).

4.3.4 The Consensus Strategy

A consensus strategy has some similarity to the concept of an ideological strategy but it requires a common agreement of objectives and policies within the organisation, without its members necessarily having a prior agreement on ideology or culture. In this instance strategic systems will be needed to capture and spread the strategic vision (Davis and Davidson 1991) and the alignment of internal strategies will be of paramount importance. Such strategies are often adopted by organisations undergoing major change (Morrison 1996), where it is important that a new culture is developed from within (rather than being

imposed from above or from outside), as in the case of the major consensual re-orientation of Rover Cars called 'Roverisation' (El-Namaki 1992).

4.2.5 The Planned Strategy

A planned strategy is one that is developed and promulgated within an organisation by a central body or individual and which requires a rigid organisational form with effective, predictable channels of communication with consistent processes and rules (i.e. a bureaucracy). Flexibility will probably be of less importance within this type of strategy than being able to develop a long-term visionary plan and to co-ordinate the functional strategies and internal infrastructures (including those relating to IS/IT) in support of this plan. Planned strategies appear to be adopted by organisations which aim for rapid growth and which require uniformity in business operations, such as 7-Eleven Stores (Kotabe 1995) and Wal-Mart in the retail sector (Vance and Scott 1994) and McDonalds and Burger King in the fast-food sector (Bosch 1996).

4.2.6 The Process Strategy

This is another variety of bureaucratic strategy and implies that the strategists will seek to control the process by which the strategy is produced, rather than the content of the strategy. In this view, a strategy may be produced in a variety of ways, providing that the outcome of the strategic process is acceptable and effective. In this case, the development and promulgation of business vision is likely to be of relatively minor importance, but flexibility of infrastructures and cohesion between internal sub-strategies will be vital to enable a range of strategic processes to be initiated. Reference to this category of strategy is not common, but it would be appropriate for a diversified, decentralised organisation or a large, diversified holding company.

4.2.7 The Umbrella Strategy

In this case the strategists provide a strategic umbrella (i.e. a set of guidelines or rules of engagement) that leaves the detail of strategy and the implementation of objectives to a delegated body of tacticians at a lower organisational level. Obviously vision will be less important to an organisation which operates such a type of strategy (there is no end state to be communicated) but flexibility of infrastructure may be of great importance and organisation will need to be able to direct its manoeuvring for position within its competitive environment. As with the process strategy, this is a viable approach for a diversified holding company.

4.2.8 The Disconnected Strategy

This is in some ways the opposite of the umbrella strategy, as the total responsibility for strategic development is devolved to strategic business units that set their own strategies without regard to central guidelines. Strategic vision will be of relatively low importance

in support of a disconnected strategy and cohesion between strategies in such a fragmented scenario may be a minor consideration. In such cases, however, infrastructural flexibility (Deleuw and Volberda 1996) and strategic positioning will be vital to a company that operates a set of disconnected strategies.

This typology of strategy describes strategies that are complete and operational. It is important to understand these strategies and their relationship to the firms that operate them and the systems that support them. It is equally important to examine the processes or approaches by which the strategies are developed, as this inevitably impinges on the development of the IS/IT applications. These approaches are described in the next section.

4.3 Approaches to Developing a Strategy

It is clear from the literature search that one of the types of strategy from this range will be more appropriate to a given business situation than others, and that the different types of strategy will emphasise different aspects or components of the strategy. There are certain aspects that are consistently important in all of these types of strategy: first, adopting and sustaining a position in relation to environmental forces, second, developing and promulgating a vision of a desired future state, and third, being robust and flexible in response to unpredictable changes. These factors refer to the content of the strategy, but they also influence the process by which the strategy is developed. Mintzberg (1990) identifies ten approaches to strategy which he terms schools of strategic development. It is useful to examine each of these in turn to give an idea of the range of influences on the strategic process:

4.3.1 The Planning School

Proponents of the planning approach see strategy development as a formal process of incremental or gradual change. In this view, strategy development is decomposed into a methodological series of steps or stages which can be achieved by using recognised techniques such as SWOT analysis (Glaister and Falshaw 1999) or core competence definition (Hamel and Prahalad 1989) to produce a set strategic direction. This is followed by a series of tactical stages in which the organisation manoeuvres towards a desired end-state. The approach is typified by the work of Ansoff and Mintzberg, the two authorities differing mainly on the structure of the strategic process. In Ansoff's view rules are the basis of the strategic process and the strategy is formulated as a result of applying these rules (Ansoff 1984). Also, the process has two distinct phases: formulation, during which the strategy is produced, and implementation, during which it is enacted (Ansoff 1984). Mintzberg states that the basis of the process is in actions, believing that strategies emerge or are formed throughout the process, rather than being

formulated at the inception of the process. Also, Mintzberg does not distinguish between the creation and the enactment of a strategy, seeing them as two aspects of a single process (Mintzberg and Quinn 1996). By emphasising the formality of rules and actions the planning approach puts forward an essentially reductionist view of the strategic process. It has, however, been pointed out that strategy development requires a synthesis that is not supported by the decomposition and formalisation of the planning school.

4.3.2 The Design School

The design school approach can be summarised by the following steps (Mintzberg 1990). First, an environmental scan, appraising the threats and opportunities which the external environment presents to the organisation now and in the foreseeable future and determining the critical success factors (Bullen and Rockart 1984) for successful operation in that environment. Second, an internal audit, identifying the strengths and weaknesses which the organisation possesses (Robson 1997), and identifying its distinctive competencies (Hamel and Prahalad 1994). Third, an evaluation of the candidate strategies using a technique such as gap analysis (Argenti 1980) to take into account any variance between the firm's desired position and the actual position and, finally, the implementation of the chosen strategy (Mintzberg 1994).

The design school regards the search for competitive advantage as a bridge between strategy formation and strategy implementation and stresses the importance of achieving a strategic fit between the organisational (internal) and environmental (external) factors, usually under the control of a master strategist (Mintzberg 1990). However, Mintzberg identifies three fallacies that apply to strategies formulated by design, as follows:

- **The fallacy of prediction**, in which it is assumed that the domain will remain stable throughout the strategic design process and that the strategists can predict at the design stage the behaviour of all the elements in the strategy;
- **The fallacy of formulation**, in which strategy is viewed only as a mechanistic and sequential process;
- **The fallacy of detachment** in which strategic plans are formulated separately from their implementation and strategists are viewed as being detached and remote from the details of the implementation.

In other words, formality in strategy setting cannot replace strategic vision and creativity (Coulson-Thomas 1992), and Mintzberg criticises the design approach because it views strategy as a static process and places too great an emphasis on the role of the individual strategist. Mintzberg sees this as being an unrealistic simplification as 'no amount of elaboration will ever enable formal procedures to forecast ... to inform ... (and) to create novel strategies' (Mintzberg 1994).

4.3.3 The Positioning School

This approach to strategy development centres on the selection and adoption of a strategy aimed at giving a firm a positional advantage in its market through manoeuvring itself into an advantageous position where it is able to leverage its distinctive competencies and realise its intended strategies (Ansoff and Sullivan 1990). The approach of the positioning school is typified by a three-stage approach. First, a desired position is identified through the use of a positioning framework (e.g. Porter's ICA model) to suggest a valuable position in its market (Porter 1980). Second, the desired strategic position is achieved through strategic manoeuvring and the enactment of competitive product/market strategies and third, the valued position may be sustained and protected from undesired environmental forces.

Although competition (for position) and defence (of a strategic advantage) are important concepts, collaboration and alliance are also recognised by the positioning school as valid positioning techniques (Ketelhohn 1993). The approach can be criticised because of the difficulty of identifying the factors that give organisations their positional advantage and competition frameworks appear more frequently in the literature as devices for explaining existing successful strategies than creating new ones.

4.3.4 The Political School

There is a tendency to see organisational processes (including strategy setting) as mechanistic and ordered by a basic set of rules. Ultimately this gives rise to a reductionist approach that ignores the complexity of strategy and the key organisational relationships that are central to the process (Freedman 1992). Proponents of the political school of strategy, as typified by the work of Senge (1990) take a more holistic approach that recognises the role of structural conflict and focuses on low-level processes rather than on high-level goals. Strategy development, according to this approach, is a process of negotiation and bargaining that involves coping with organisational forces and individuals' reactions to the strategic process.

'Most see themselves within a system over which they have little or no influence...the perception that someone "up there" is in control is based on an illusion - the illusion that anyone could master the dynamic and detailed complexity of an organisation...' (Senge 1990). Political strategies may take place at the micro level, which consists of challenges for power or to create or resist change within the organisation, and the macro level, which reflects the organisation's position in its environment. A criticism that is levelled at the political school is that strategies based on organisational politics (at either level) may tend to fragment or factionalise an organisation.

4.3.5 The Cultural School

Where strategies derived by the political school are based on formal political positions, strategies of the cultural school are based on stakeholders' perspectives founded on cultural values. There is little doubt that many organisations that do not have a formal strategy (i.e. one based on one of the other schools) are in fact operating a cultural approach to strategy development. Cultural norms are particularly influential in periods of business stability (Boynton 1993), but are less likely to be useful (and may even be dangerous) in turbulent conditions (Hamel and Prahalad 1994). Strategies of the cultural school are open to criticism on two counts. First, organisational culture tends to change relatively slowly, which may promote stagnation in the strategic process, and second, culture can be affected adversely by strategy. A balance between strategy and culture is difficult to build and recreate but imposing a strategy that conflicts with the organisation's cultural values can easily destroy it.

4.3.6 The Learning School

If cultural strategies are effective during periods of long-term stability and low levels of strategic change, then periods of dramatic environmental change may prompt a need for organisational learning in strategy development. The learning school takes an emergent view of strategy and promotes the belief that the unpredictability and changeability of the business environment effectively prevents the deliberate formation of meaningful strategies. According to the learning school, other approaches to strategy development lack the ability to capture a vision of the future environment and are incapable of producing strategies that are sufficiently flexible to cope with radical change. It follows that the only valid approach to strategy development is to monitor the present and to seek to understand what strategy is likely to be effective by analysing the successes (and failures) of the immediate past. The results of this exercise can then be incorporated into the strategy by a process of organisational learning (Argyris 1982). The approach is open to criticism because in some situations it can produce a series of disjointed short-term strategies and the learning process may incur significant organisational overheads.

4.3.7 The Entrepreneurial School

The entrepreneurial school holds that a successful strategy comes from a vision of the organisation's future development that exists in the mind of a leader or of a leading *cadre* or elite group. According to this view, strategy formulation is seen as an informal process based on the experience, intuition and the personal characteristics of the leader or the *cadre*. Apart from this, the features of the realised strategy tend to be closely associated with organisational culture, which is within the province of the cultural school.

4.3.8 The Cognitive School

This school of strategy is similar to the entrepreneurial school, in that its adherents believe that strategy exists in the minds of some of the stakeholders within the firm. Strategy formation is therefore affected by the same limitations that apply to the human cognitive process and strategy formation is based on opinions, instincts and the strategy actors' reactions and responses to soft information. In this school the success of both strategy formation and implementation relies to a great extent for its success on the ability of individuals to think strategically, to develop a vision of an intended future situation and to have the necessary mental abilities to put it into practice.

4.3.9 The Environmental School

The environmental school of strategy views the strategy formation process as an analysis of the business environment and the influence of certain forces within it. The organisation will therefore respond to specific competition factors that will tend to cause the organisation to position itself in its environment (e.g. a market niche) and will undertake a mechanistic process to become stable in this position. The classic examples of such forces are the five forces of industry competition described in Porter's ICA model (Porter 1980).

4.3.10 The Configuration School

According to the configuration school the strategic process is synthetic and eclectic. A strategy may be created and implemented by any of the above approaches or a combination of them. Strategies are episodic and strategies that are developed by different means will be most appropriate at different times. Also, an effective strategy may be formed by any of the processes that are espoused by one or more of the other schools (e.g. analytical, cognitive, political or visionary) and the strategy may be of any type (i.e. pattern, perspective, plan, ploy or position). The successful deployment of a strategy depends on the strategic match between the strategy and the context in which the strategy is applied. The approach introduces the concept of cycles of strategy, which must be matched with other business cycles such as cycles in the economy and in technology (Norton 1990). This raises the problem of the strategists' ability to match environmental patterns and to understand complex linkages between different strategic components. Other work on strategy has suggested that the practice of viewing the different methods of strategy formulation as belonging to different schools may be excessively reductionist and prescriptive. In practice, business strategies are developed by whatever means is most convenient or expedient at the time, or by using a combined approach (Johnson and Scholes 1993). Indeed, it is obvious that the definition of an approach is subjective in any case. Different participants in a strategy-setting process may view the same set of development activities as belonging to different schools of thought, and the perspective

from which the processes of strategic development are viewed within the same organisation may change over time. In fact, whatever approach an organisation adopts it will enact its strategies through some form of process that will be independent of the approach. It is important to examine these models of 'strategy as process' to see if there are elements in common with the approaches to strategy development.

4.4 Strategy as a Process

The business strategy literature contains many references to models of alternative strategy development processes, typically of the linear or the cyclic variety. It is worth describing briefly one example of each type. A linear or waterfall model of the strategic planning process is proposed by Argenti (1980) who seeks to describe a way of initiating individual strategic manoeuvres rather than developing a single long-term strategy, and which features the following phases:

4.4.1 Target Setting

This phase involves breaking down the organisation's long-term strategic vision into clear objectives (i.e. strategic targets) and deciding upon policies and measures of performance and target levels that are to be achieved. Silk (1991) describes an incremental process of target setting which he summarises by posing three questions first, 'Where are we now?' second, 'Where do we want to be?' and third 'What do we need to do to be there?'. Argenti advocates the setting of a multi-valued bracket target and discusses the need to set targets that are relevant to stakeholders, a practice which he describes as being 'rare and fraught with difficulties' (Argenti 1980).

4.4.2 Gap Analysis

The gap analysis phase of the process involves forecasting the future levels of performance in terms of the strategic targets and to identify gaps between forecasts and targets. Although Argenti does not prescribe the use of particular techniques, his work on gap analysis relies heavily on understanding the past through the medium of numerical techniques of financial analysis. These can be linked with the future through trend analysis and modelling and using past performance to predict the firm's future operating parameters, a process needed to predict the flexibility which will be needed to cope with future change (Deleuw and Volberda 1996).

4.4.3 Strategic Appraisal

This phase is based on parallel external (i.e. environmental) and internal appraisal activities which provide the input to an exercise to identify potential sources of competitive advantage, which in turn results in the generation of an unspecified form of strategic

options. Argenti's work on strategic appraisal (or company appraisal as he calls it) relies heavily on SWOT analysis (Glaister and Falshaw 1999) for identifying internal and external forces and weighted ranking (Laws 1988) for prioritising the potential targets. Environmental scanning sets out to 'find out how robust our chosen strategy is in case our forecasts are wrong'. It examines 'not only the actions that each of a company's competitors will take over the next five years, but also the entire market situation over that period' (Argenti 1980 p. 124). Company appraisal may be based upon a value-adding model of the organisation, and stakeholder consensus is seen as a vital part of this appraisal, leading to the identification of sources of advantage.

4.4.4 Strategy Formulation

Strategy formulation involves the generation and evaluation of a number of alternative strategic options against the specified strategic targets, the results of the internal and external appraisal exercises, and the commitment to a particular strategic manoeuvre or manoeuvres. Although offering little advice on how such choices are to be made, Argenti (1980) suggests the use of brainstorming and other informal decision-making techniques. Also, weighted ranking (Laws 1988) which has been used in the field of IS planning (Andreu *et al.* 1994) could probably be adapted for use at this stage.

4.4.5 Strategy Implementation

This phase involves drawing up action plans and budgets for the chosen strategic manoeuvre and devising monitoring and control procedures to manage its direction. The implementation phase is the area where the support of strategic IS/IT applications is most apparent. The strategic development process described here is essentially linear and exhibits many features of a waterfall model. An alternative view is to see strategy as an iterative process based on a series of incremental cycles.

4.5 Strategy as an Iterative Cycle

Davies (1993) sees the visionary component of strategy (an aspect normally attributed to the entrepreneurial school) as the key component of the strategic process, with the development process itself integrating the various aspects of the design, planning and learning approaches to strategic development. He sees this process as being driven by the business vision and proposes an iterative cycle of vision, action, adjustment and learning which he calls the strategic action process, which has the following stages:

- **Vision** - according to this view the strategic process begins with a visionary statement of the firm's overall strategic objectives. This is an expression of a desired future state which the managers wish to bring about or a generalised statement of what the

organisation intends to achieve at the end of a period of time. It is not clear, however, from Davies' work what techniques or methods would be used at this stage;

- **Evaluation**, which involves an environmental scan to determine the organisation's future prospects (i.e. its opportunities and threats) and an internal assessment of the implications of its current position (i.e. its strengths and weaknesses). This allows the future direction and performance of the organisation to be estimated. Techniques such as SWOT or TOWS analysis (Glaister and Falshaw 1999, Weihrich 1982) and a variety of financial modelling techniques are recommended;
- **Enquiry**, where the primary aim is to test the validity and feasibility of the vision statement that was produced at the vision phase by using the intelligence gained from the evaluation stage. The secondary aim is to identify and explore the gap between vision and prediction (Argenti 1980) and suggest ways of closing the gap;
- **Innovation**, which implies a creative process which is intended to identify a set of strategic options or scenarios which the organisation may enact to close the gap identified at the enquiry stage, in effect suggesting ways to make the vision concrete and to achieve it. Although no specific techniques are specified, it is implied that 'free-thinking' techniques (e.g. brainstorming) would be used to generate the ideas;
- **Selection**, which involves a choice of the most effective strategic option from the candidate strategies produced within the innovation phase. It is suggested that techniques such as cost/benefit analysis would be used to select the most suitable strategy;
- **Commitment**, where a programme of communication and empowerment is created that is intended to promote shared ownership of the strategy and to educate participants in the requirements of the strategic process. No techniques are suggested, however.
- **Design** that involves an alignment of the firm's structures and processes with the physical and organisational requirements of the chosen strategy, the planning of activities and the allocation of resources to support the strategy. Again, no methods are suggested.
- **Action**, which refers to the enactment of the strategy, the interpretation of results (compared to the original vision) and the organisational learning process that results from the cycle but, as with the previous three stages, no methods are suggested.

These processes may appear to contain some undesirable characteristics that are reductionist or mechanistic in their approach (Nohria and Berkley 1994) and which are attributes of the progressively linear models followed by such processes, resulting in what Mintzberg (1994) calls the fallacy of formalisation. Equally, they appear to imply a

decomposition of the strategic process into small parts or 'primitives' that would appear to go against the inherently integrative nature of strategic management (Teece 1987).

4.6 Criticisms of the Existing Views of Strategy

There are obvious criticisms that apply to either of these types of model. It would seem, however, that Davies' strategic action process goes some way towards recognising and overcoming at least some of the four major criticisms of formalised strategy-setting processes (Mintzberg 1990a), such as the design school approach. These criticisms may be summarised as follows:

- Organisations lack visionary capability - an organisation can really know its strengths and weaknesses only at the present time. Many of the techniques that are used for environmental scanning are not sufficiently predictive to cope with the change and uncertainty that is an inherent part of the business environment (Courtney *et al.* 1997). It is unrealistic to assume a stable or predictable strategic environment the so-called fallacy of prediction Mintzberg (1994). Without an accurate vision of the future it is difficult for managers to know whether an organisation's distinctive competence will be a strength or a weakness, and therefore strategies cannot be pursued to these ends with any confidence;
- Strategy and structure cannot be separated (i.e. they are inherently cohesive) and are substantially dependent on one another, and changes in one of the strategic elements (e.g. the organisational structure or the technology infrastructure) will automatically imply changes in one or more of the others. This is what Mintzberg (1994) calls the fallacy of detachment - that the formulation of strategy must be separated from its implementation details. As Vandermerve (1995) points out, 'Whether their structures drive strategy or their strategies gradually lead to new structures, what is inevitable is that they (organisations)...concentrate efforts on delivering value...';
- The process of formulating strategy may in itself inhibit strategic flexibility in three ways. First, in seeking to break down the strategic process into a series of steps, each of which must be frozen before moving on to the next a firm may find that its strategy is increasingly divorced from its future needs - the fallacy of formalisation (Mintzberg 1994). Second, by focusing on a limited set of strategic goals, organisations may suffer from 'restricted peripheral vision' and miss more beneficial alternative courses of action (Campbell and Alexander 1997). Third, the separation of formulation and implementation in strategy formulation can result in a resistance to change due to the lack of a common view, lack of communication or lack of understanding (Kotter 1990). Strategic success depends on an organisation's ability to react swiftly and effectively to environmental change (Battaglia 1991) rather than forging ahead with a strategy which may be out of date or focused too tightly on specific objectives.

The full import of the fallacy implied by the formalisation of the strategic formulation process is summarised by Mintzberg, 'No amount of elaboration will ever enable formal procedures to forecast discontinuities, to inform detached managers [and] to create novel strategies' (Mintzberg 1994). It is Mintzberg's view that strategic planning is defunct, and that strategic analysis is in practice replaced by strategic synthesis (Mintzberg 1994) and that all prescriptive perspectives of strategy formulation (i.e. the approaches of the various schools of strategy) 'should be confined to the garbage heap of history' (Mintzberg 1990a). This is refuted firmly by Ansoff, who feels that it is Mintzberg's view and definition of strategy that is obsolete. This is because it does not recognise the changes to the strategic process that have taken place 'since the nineteen-sixties'...in response to a more volatile business environment and particularly [by definition] to changes pertaining to and caused by new technology (Ansoff 1994).

A summary of Ansoff's view of the strategic process is that it must evolve, and that none of the approaches of the prescriptive schools (e.g. the design school and the learning school) place emphasis on less formal factors that are more important in a modern business environment (Ansoff 1991). Johannsen (1995) reinforces Ansoff's view by pointing out that constantly changing strategies emphasising creativity and flexibility are necessary to achieve shifting organisational aims. Langley (1995) observes that an emphasis on formal strategy-setting techniques can lead to a lack of flexibility in the strategic process that he terms 'analysis paralysis'. Alternatives to the formalisms of the prescriptive schools of strategy have been discussed with varying degrees of enthusiasm (Mintzberg 1990b). A more informal, flexible approach to strategy is criticised as 'muddling through' by Muller and Watts (1992), while Seeger (1984) believes that formal models of strategy are over-simplistic, placing a premium on common sense.

4.7 Principals of Strategy Development

Although the variety of the foregoing factors indicates that the strategic development process is extremely diverse, it is apparent that certain principals can be discerned in all of the approaches and schools of strategy development. These factors are dimensions of effective strategy and are as follows (Mintzberg and Quinn 1992):

- Successful strategies appear to develop around the effective planning and execution of a limited set of key manoeuvres or strategic thrusts that require precise timing and a closely focused application of resources. These thrusts form a pattern within the overall strategy that seeks to achieve a strategic position;
- Effective strategies appear to plan for and be flexible in the face of unpredictable changes in the environment - not just the unpredictable but the unknowable - which

have long been recognised as barriers to the realisation of strategies (Lindblom 1959). This has been termed a flexible posture.

The essence of strategy ... is to build a posture that is so strong [and potentially flexible] in selective ways that the organisation can achieve its goals despite the unforeseeable ways (in which) external forces may interact when the time comes.

(Mintzberg and Quinn 1992 p. 10)

- Effective strategies apparently feature strong evidence of the integration of the three essential elements of strategy (goals, policies and programmes) into a cohesive whole which determines the 'overall direction and action focus of the organisation' in support of its vision (Mintzberg and Quinn 1992);
- Complex organisations that develop and operate strategies successfully appear to have a number of hierarchically related and mutually supporting strategies each of which must be more or less complete and autonomous, but linked to form a cohesive overall strategy.

4.8 Summary

The literature search into the business strategy domain appears to confirm some of the researcher's prior expectations. There would appear to be four important components of business strategy that are consistently present in many of the views of strategy, the approaches to strategy development and the strategic processes themselves. As these 'strategic components' are so important and recurrent in the strategic context, it follows that they form an important part of the link between the content and process of strategy development and the development and operation of strategic IS/IT applications. The terms used here to describe the formalised strategic components are slightly different than those used by Mintzberg and Quinn (1992), or by the researcher in describing the prior expectations, but the concepts are similar to both:

- **Strategic positioning**, which represents the ability of an organisation to perceive and secure a position in its market relative to its competitors in response to forces that affect the whole industry. This element is typically emphasised in strategies that are based on competitiveness;
- **Strategic flexibility**, which implies the ability of an organisation to change strategic direction (e.g. to enter new markets), to abandon existing strategies which are no longer tenable and to introduce new strategic initiatives at short notice (Deleuw and Volberda 1996). This element is often intended to cope with periods of environmental turbulence and intense competition;

- **Strategic vision**, which is the ability of an organisation to innovate, to achieve a sense of direction and to envisage future situations that may present it with opportunities or threats. This element is common in first mover strategies;
- **Strategic alignment**, which refers to an organisation's ability to develop a strategic portfolio which displays synergy (e.g. the strategies of the various business functional areas are aligned with the overall business strategy). Strategic alignment has been widely discussed in an IS/IT context (e.g. Thomas and Dewitt 1996, Luftman *et al.* 1993). Alignment will have a strong influence on this research and will be a major factor in determining a framework for linking business strategy to the development of strategic IS/IT applications (Wassenaar 1991).

These four components from the strategy domain appear to match four of the five aspects that were believed by the researcher to link the strategy domain to the other main domain of the research (i.e. the development of strategic IS/IT applications). These were identified at the beginning of this chapter. To this extent the researcher's expectations are confirmed, at least in part, although there is little evidence at this stage to confirm that the fifth expected aspect (i.e. integration of the value chain) is a common component of the business strategy process. At this stage of the research, the combination of prior expectations based on experience and more formal knowledge (gained during the literature searches in the two research domains) has identified a set of components that it is believed will be important in the development of the proposed strategic linking method. This method will be the major deliverable of this research project. The next stage of the research is therefore to develop a set of research questions and hypotheses based on the existence and importance of these strategic components. It will then be possible to find out if the strategic components are purely 'theoretical' (i.e. existing only in the literature) or whether the researcher's empirical experience of their importance is confirmed in practice. First, however, it is necessary to research the conceptual frameworks, development methods and techniques that are available for use in developing strategic IS/IT applications (as are defined in Chapter 3). This is the subject of the following chapter.

Chapter 5

Development Methods for Strategic Systems

The case studies and analytical reports on strategic IS/IT applications describe in great detail the features of strategic systems, the ideas behind them and the impact they had on the organisations. They are, however, noticeably lacking in information on how the systems were developed. Methods for formulating IS/IT strategies have been surveyed (e.g. Galliers 1991b) and frameworks and methods are claimed to have potential in this application (e.g. Lederer and Gardiner 1992a). There is, however, an almost complete absence of information about the methods or techniques that were used to develop the strategic systems in the cases. This is very different to the literature on non-strategic systems, in which the use of methodologies and techniques is often reported. A similar situation occurs in the literature on business strategy, in which examples of the development and implementation of strategies in specific organisations include descriptions of strategic frameworks in use (e.g. Callon 1996).

In the previous chapter a number of features were identified with which a strategic systems development process must be compatible. First, there are recognised types of business strategy (e.g. entrepreneurial, planned or disconnected strategies) which have different philosophies and requirements. Second, there is a range of approaches to strategy development (e.g. cultural or environmental strategies) which must be supported at a functional level. Third, there are key properties of a successful strategy (i.e. competitive position, flexibility, vision and strategic alignment) which should be represented. It may be inferred that strategic systems are developed through the use of techniques from both domains. Strategic frameworks are used at the front end of the development process (e.g. identifying business opportunities and planning strategic manoeuvres) and normal IS development methods are used in the analysis, design and implementation of the systems.

This assumption, however, leaves an uncomfortable gap in the body of knowledge with regard to the techniques that are available and how they may be linked in practice. This gap must be closed before any valid recommendations can be made about strategic systems development methods in general. The purpose of this part of the research is to examine the literature for techniques that have the potential to support the development of strategic systems, to produce a list of candidate techniques and to examine them from three perspectives, as follows:

- The strength of their linkage with the approaches to business strategy development and the range of strategy types which are described in Section 4.2;
- Their ability to offer technical support to the key components of the business strategy development process (e.g. strategic positioning, strategic vision and strategic flexibility) that are identified in Section 4.8;
- Their compatibility with other components of the conventional systems development process (e.g. systems analysis and design, and implementation).

The literature describes two types of process that can be used in the development of strategic systems. These are called frameworks and methods, and it is apparent that both have their roots in different domains and have different value as development aids (Johnson 1997). In order to clarify the terminology and to attempt a classification that will assist in assessing their value, the processes are examined separately.

5.1 Strategic IS/IT Frameworks

The literature on IS/IT development acquired a new concept in the middle 1980s, when a number of frameworks appeared in response to a need to 'analyse information systems from a strategic perspective' (Doyle 1991). These strategic frameworks showed a variety of forms, such as 'recipe lists, agendas or grids' (Angell and Smithson 1991). They were considered to have a variety of uses as practical techniques to support individual activities or single decisions (e.g. Porter and Millar 1985), as methodologies to support complete processes or projects (e.g. Ives and Learmonth 1984) and as educational and pedagogical tools (e.g. Earl 1989). The use of frameworks in the domain of strategic IS/IT applications was borrowed from the business domain (Angell and Smithson 1991). The strategic potential of IS/IT began to be realised by the business community (e.g. Porter and Millar 1985, McFarlan 1984, Parsons 1983a) and the users of these adopted frameworks sought to extend their use to the identification of opportunities to deploy IT in support of business objectives. The proponents of the frameworks intended them to help technology managers 'understand the disposition of IS towards organisations and *vice versa*' (Angell and Smithson 1991) and to help the business strategists 'appreciate the new business opportunities inherent in IT/IS' (Doyle 1991). Significantly, both of these views appear to support the educational or analytical purpose of frameworks. Otherwise the definition of what constitutes a framework in the strategic IS/IT domain is confusingly diverse and imprecise, and the way in which frameworks are intended to be applied and used is equally unspecified. The most thorough examination of frameworks in the literature is by Earl, who classifies the types of framework to guide the choice 'for the right purpose in the right context' (Earl 1989). This is the most significant difference between Earl and previous proponents of strategic frameworks who tend to promote one at the expense of others (e.g. Wiseman 1985, Ives and Learmonth 1984). Earl's work is

the closest to a taxonomy like those that exist for IS development methods (Grimshaw 1992) and is therefore a suitable basis for an analysis of frameworks. This section includes an analysis of Earl's model followed by a critical appraisal of the model and of the concept of frameworks. Earl identifies three classes of frameworks: awareness, opportunity and positioning frameworks, to which he ascribes three objective attributes (purpose, scope and use) each having its own attributes and role in the strategic process (see Figure 5.1).

Framework Quality	Awareness	Opportunity	Positioning
Purpose	Vision	Ends	Means
Scope	Possibility	Probability	Capability
Use	Education	Analysis	Implementation

Figure 5.1 A Framework of Strategic IS/IT Frameworks After Earl (1989)

5.2 Awareness Frameworks

Awareness frameworks are high-level conceptual models that may be used for raising management awareness of the business potential or impact of IS/IT. The purpose of such frameworks is to promote a vision of a future strategic and their scope is to reveal the possibility of utilising IT to achieve future business objectives. Awareness frameworks are used for educational purposes, as they are 'more conceptual and pedagogic than prescriptive and instrumental' (Earl 1989). Three sub-classes of awareness framework are identified. First, refocusing frameworks, which provide new perspectives, second, impact frameworks that allow discussion of strategic change and third, 'scoping' frameworks that attempt to define the strategic possibilities that IT affords.

5.2.1 Refocusing Frameworks

The purpose of refocusing frameworks is to encourage managers to re-examine the internal aspects of their business, such as structure, operations and processes, and external

factors such as the actions of competitors and the demands of the market place. Benjamin describes a technique called the strategic opportunity matrix that they use to examine and explain a number of exemplars of strategic applications of IT. The framework is based on 'two searching questions that a manager should ask' in two strategic areas (Benjamin *et al.* 1984). First, what are the possible structural changes and new business possibilities that IT can enable in pursuit of competitive advantages and second, how can IS/IT can be deployed in support of existing business processes and systems. Earl sees this type of framework as a powerful pedagogic tool to be used in raising executive awareness. He admits that they can be 'too general for firm-specific use' (Earl 1989) in spite of the fact that the whole thrust of the original publication by Benjamin *et al.* (1984) is to focus on specific applications of the matrix.

5.2.2 Impact Frameworks

The limitations of refocusing frameworks in identifying specific business opportunities may be overcome by using models in the impact framework category. A characteristic example of this category is linked to the strategic IT mapping technique (Parsons 1983b) which draws on Porter's ICA model (Porter 1980) to identify and describe the effect that IT can have at three levels: the industry, the firm and strategy. Parsons argues that IT can be used at these levels to support Porter's three generic competitive strategies and help in the enactment of these strategies by identifying opportunities to deploy IT strategically, and for checking the fit of a proposed IT application with an existing business strategy. Parsons describes the application of a strategic IT mapping framework and a potential IT applications grid. Earl makes the point that such an impact framework can be a powerful 'tool of persuasion' (Earl 1989) that can be tailored to a particular industry or firm. It is also possible to include in this category the strategic grid (McFarlan 1984), which seeks to identify the firm's reliance on IT and the impact of IT on the business and which shares some features with the marketing growth/share matrix of the Boston Consultancy Group (Ansoff 1987).

5.2.3 Scoping Frameworks

Scoping frameworks are intended to 'indicate what might be the overall strategic scope of IT for a business or sector' (Earl 1989). Scope refers to the extent of the company's product or service range that may be delivered by a strategic system, or the degree to which the product or service may be exploited by the strategic use of IT. Earl offers as an example of such a framework the information intensity matrix, which is used to assess the information content of the firm's products and services and of the value chain (Porter and Millar 1984). The technique has been used to predict the potential for the strategic use of IT in a variety of industries. Earl (1989) gives the UK newspaper, banking and petrochemical industries as examples of industries in which firms have a high information

intensity and high product information content and which he postulates are therefore likely to develop strategic IS/IT applications. Examples of such systems are rare in the oil refining and cement industries, which have low scores in both dimensions. Earl admits that although this information may be useful in raising the level of awareness of the strategic potential of IS/IT, particularly among business executives, frameworks in this category are not prescriptive enough to be usable for identifying opportunities for strategic systems development (Earl 1989).

5.3 Opportunity Frameworks

Unlike awareness frameworks, opportunity frameworks are intended to guide the development of strategic IS/IT applications by identifying specific business opportunities and suggesting ways to apply IT to give strategic advantage. The purpose of such frameworks is to direct the strategists towards the ends that may be achieved by using IS/IT, and their scope is to examine the probability of the IS/IT applications achieving successful strategic outcomes. The use of opportunity frameworks is basically analytical, in that they can be used to analyse the systems and strategies that will enable strategic objectives to be achieved (Earl 1989). Frameworks in this category are intended for use in creating an agenda for the development of IS/IT applications that support business strategy. In Earl's view opportunity frameworks are divided into four sub-categories: business strategy frameworks, 'technology fitting' frameworks, application search tools and systems analysis frameworks (Earl 1989):

5.3.1 Business Strategy Frameworks

Frameworks in this sub-category can be used to develop and to clarify business strategies and therefore to suggest the potential of IT to support these strategies (Earl 1989). Probably the most common example of a business strategy framework is Porter's ICA framework (Porter 1980), which seeks to model five competitive forces in a given industry sector. Porter's framework is descriptive as it helps to explain the environmental forces that act on a firm and suggests some possible reactions to those forces. It does not, however, give specific guidance on or recommend detailed procedures for identifying opportunities. For this a prescriptive framework is required, and Wiseman's strategic options generator (SOG) is an example of such a framework (Wiseman 1985). Wiseman based the SOG on Porter's work and Chandler's growth strategy model (Chandler 1967) and the SOG framework is intended to be a practical business tool for use in strategy-making where IT is an enabler of the strategy. In discussing business strategy frameworks, Earl (1989) considers them to be useful in providing a context for other frameworks or methods, but insists that their use requires a well-thought-out strategic agenda and the involvement of strategic analysts. These features appear to place frameworks in this category firmly in the domain of business strategy, from which they are

derived. No doubt they can be adapted for use in an IS/IT development context, but it is equally apparent that they need to be linked to other frameworks or techniques to allow the implementation of the technological components of the system.

5.3.2 Technology Fitting Frameworks

Frameworks in this category may be used to match the information requirements of particular applications to the technological specification of the organisation's systems. A close match between the technological attributes of the system and the information requirements of a business opportunity may indicate a high potential for the system to deliver strategic advantage. Earl himself makes the point that newer technologies and more diverse applications require the use of more varied fitting frameworks (Earl 1989) and was involved (Runge and Earl 1988) in the development of an opportunity matrix for exploiting telecommunications technology in specific business applications. This is a derivative of Ives and Learmonth's customer resource life cycle technique (Ives and Learmonth 1984). In researching the framework, Runge and Earl discovered that most examples of strategic telecommunications systems had developed gradually. Many had begun as systems for supporting internal linkages, and for which a role was subsequently suggested involving the extension of the firm's value chain into that of customers and/or suppliers, for instance electronic data interchange (EDI) systems. This use of the framework mirrors the experience of other researchers into strategic systems (e.g. Ciborra 1991). It is significant that these frameworks are dedicated to specific strategic applications of IS/IT. The Runge and Earl framework is intended to apply only to telecommunications-based systems and a framework developed by Meredith and Hill (1987) is intended for use in a manufacturing environment. Technology fitting frameworks are dedicated because the technology tends to be specific, while business strategies are generic.

5.3.3 Systems Analysis Frameworks

Earl points out that the traditional IS development methods which analyse the information flows, and data stores and processes 'rarely have a strategic perspective' (Earl 1989) and are therefore of limited use in defining precisely opportunities to apply IS/IT strategically. A framework that carried this function would therefore need to analyse business processes and information or material flows from a strategic perspective by examining their contribution to the business. An example of such a framework is the value-chain model (Porter 1985). This views a business as a transformation process which is separated into primary and secondary activities and which examines the potential of IT to automate processes in line with the business activities and to enable linkages between them to exist. Systems analysis frameworks only operate at a high level of application and can therefore only highlight business areas in which IT may have strategic potential. They 'cannot

prescribe what particular technologies have potential and they do not delve into the specific possibilities of highlighted application areas' (Earl 1989). This implies that an ancillary set of frameworks is needed to provide a higher level of focus on applications.

5.3.4 Application Diagnosis Techniques

Earl calls the category of framework which is intended to carry out this role an applications search tool, which focuses on specific applications and specific technologies to identify the linkage between the business opportunities and the information and technology requirements of the system. This is helpful to 'strategists and systems developers who decide to attack a business activity or application area and assess whether any form of IT usage could yield competitive edge' (Earl 1989). Earl identifies the need for a tool with two levels of functionality: first, to 'prompt the analyst to ask key questions about where and how IT might produce competitive advantage' and second, to 'test creative ideas against a sound business and strategic rubric' (Earl 1989 p. 49). Examples of such tools include the customer resource life cycle (Ives and Learmonth 1984) upon which Runge and Earl based their technology fitting framework and the opportunities search framework which has been used to examine the UK travel industry's strategic use of value-added networks (Feeny 1988). One valuable attribute of search tools is that they can form a middle ground upon which the stakeholders may communicate by asking questions which are 'familiar to [technology] specialists and managers in the application area' (Earl 1989 p. 51).

5.4 Positioning Frameworks

Positioning frameworks are intended to aid executive management in its assessment of the strategic importance of IT to the enterprise and its understanding of how IT should be managed in order to develop and improve the organisation's technology and business capabilities. These frameworks have an internal focus and are concerned with examining the potential of specific organisations to use IT strategically by assessing, developing and improving their IS/IT capabilities. They can be used to indicate the management task that is involved in identifying and exploiting IS/IT opportunities and the term 'position' appears to refer to the current position of IS/IT in the organisation. The purpose of such frameworks is to identify the means by which strategic systems may be developed (i.e. the resource capabilities), and their scope is to assess the firm's capability to deploy IS/IT resources successfully. The use of positioning frameworks is 'implementational' in that they examine the factors that are likely to constrain the development of the IS/IT applications (Earl 1989). Earl identifies three types of framework that would fit into this classification, which he terms scaling frameworks, spatial frameworks and temporal frameworks:

5.4.1 Scaling Frameworks

According to Earl, the purpose of scaling frameworks is to identify the role and importance of IT applications in a particular organisation and to inform the management decision process in terms of future systems development (Earl 1989 p. 58). Although he does not state it specifically, Earl is referring to the practices of application portfolio management and strategic information systems planning (Lederer and Salmela 1996). An example of a technique recommended by Earl for use as scaling framework, is the strategic grid technique (McFarlan 1984) which can be used in an 'education, workshop or consulting mode' (Earl 1989 p. 59), implying an exploratory or educational role for the framework.

5.4.2 Spatial Frameworks

The nature and purpose of spatial frameworks is not clear from the examples which Earl gives, although it seems that spatial frameworks are intended for use in conjunction with scaling frameworks. The term 'spatial' appears to refer to the room for manoeuvre that an organisation has in seeking to deploy IS/IT strategically. The extent of this strategic space is influenced most heavily by the nature of the organisation's business, particularly the market sector in which the organisation operates, and forthcoming changes in operating parameters such as new legislation or economic conditions. The most obvious example of a spatial framework is Earl's own Sector Framework (Earl 1983) which identifies the strategic context of four industry sectors and relates them to the characteristics of the planning, organisation, control and technology policies that the organisation pursues.

5.4.3 Temporal Frameworks

Studies over a considerable period of time have indicated that the strategic potential of IT (and an organisation's ability to exploit and support that potential) is subject to an evolutionary process over time. This is indicated by the many stages of growth models (e.g. Bhabuta 1988, Nolan 1979) and the assimilation of technology model (McFarlan and McKenney 1983) which imply that the ability to use IS/IT strategically will occur at the right stage and the right time for that organisation. Earl recommends the use of such stage models in combination with scaling and spatial frameworks to identify and reduce the strategic risk of systems development. The attempt to develop strategic systems should not be made, he suggests, until the organisation is at a stage of information management maturity where it can develop and operate such systems viably. As Earl points out,

Stage three 'control' management is fatal in drive sectors, as it tends to drive out innovation and experimentation. Stage two management can be potentially dangerous if sustained for too long in delivery sectors... Even more lethal is a combination of stage three 'control' management with 'turnaround' positioning on the strategic grid. Here the dead hand of cost

consciousness and tight resource management constraints precludes major initiatives and leadership by exhortation.

(Earl 1989 p. 61)

This statement makes the point that frameworks cannot be applied in isolation, and that links with other types of framework are necessary not only to exploit opportunities but to prevent negative side-effects. The effective choice of a strategic framework appears to be an important determinant in securing business success.

5.5 Criticisms of Strategic Frameworks

This critique of strategic IS/IT frameworks has two objectives: first, an examination of the concept of strategic frameworks is carried out, and second, an assessment is conducted into Earl's model as a method by which IS/IT applications that support the business strategy can be developed. Certainly a shortage of information about frameworks appears not to be a problem. In an examination of the concept of strategic frameworks, Doyle (1991) identifies a number of significant problems with their use of which the following is a representative sample:

5.5.1 The Multiplicity of Frameworks

The proliferation of frameworks (more than fifty are identified in the literature search) is both confusing and unproductive. On inspection, it is apparent that many frameworks have a very specialised purpose and in some cases the difference between their features and purpose is relatively small. This prevalence and variety may imply a beneficial range of choice, but on the other hand 'one might take the existence of [so] many frameworks as proving that none is adequate' (Doyle 1991 p. 274). In practice, this complicates the choice of a suitable framework and increases the amount of time that a practitioner would need to spend on researching the possible frameworks for a given application and learning to use the adopted framework.

5.5.2 The Limited Scope of Frameworks

It has been pointed out that many of the frameworks are specialised and with functionality directed to a particular purpose. Somewhat unconvincingly, Doyle offers the observation that 'no single SIS framework captures The Truth...each may illuminate a particular aspect of the environment...any one framework is a small subset of The Truth' (Doyle 1991 p. 274). Doyle suggests that a number of frameworks would need to be applied in order to be effective in a given application. In fact, as most methods which are used in other disciplines need to combine a number of techniques in order to give a complimentary perspective on a situation or to cover all sections of a development life-cycle (Palvia and Nosek 1993). Also, it would seem that strategic frameworks do not need to represent

'The Truth' (Doyle 1991 p. 274). The corresponding techniques in other disciplines (e.g. IS analysis and design) do not week seek to 'represent the truth' but to model a situation.

5.5.3 The Cost of Framework Choice

The choice of framework is obviously important, but the variety of frameworks makes this choice difficult and it may not be possible to assess the correctness of the choice until after the framework is applied (Doyle 1991 p. 274). Doyle suggests three ways to proceed towards a solution to this dilemma. The first is the development of a unified theory that would guide the choice of framework, which would seem to be unlikely. Second, the use of alternative metaphors to 'frameworks as laws or The Truth' (Doyle 1991) which exploit and augment the positive features of strategic frameworks, effectively turning the problems into opportunities. Third, the use of a 'metamodel' that could be used to guide the choice, which could describe Earl's framework of frameworks and the IBM knowledge-based selection system called SPARK (Gongla *et al.* 1989). It must be concluded that such aids to choice are unproved, and that there are still 'many more ways of getting the wrong combination than the right one' (Doyle 1991 p. 274). This is a convincing argument and, in the absence of experience of their application, a method (or methodology) for guiding the choice of SIS frameworks is probably the most useful aid which could be made available to practitioners. Again there is an analogy between the current state of strategic systems development and the situation in which the IS analysis and design discipline found itself in the 1970s. In both cases the discipline began with the development and publication of a plethora of unconnected techniques (often differentiated from each other for proprietary or commercial reasons) which solved technical problems but which presented considerable management and control difficulties. In the case of IS analysis and design the response to these problems occurred in the 1980s with the development of systems development methods, which combined the techniques, each with a pre-defined purpose (Avison and Fitzgerald 1995).

5.5.4 The Specialisation of Frameworks

This factor affects the effectiveness of frameworks in three ways: first, some frameworks are only applicable to organisations of a particular type or in a specific business sector. It is a telling point that two of the most common strategic frameworks - the ICA model and value chain model - are not truly applicable to organisations that do not seek competitive advantage. Second, frameworks are also subject to cultural factors that may limit their applicability. Doyle cites the influence of 'the dominant American business culture...they reflect the preoccupation of that culture. One might question how well they work elsewhere...' (Doyle 1991 p. 275). Third, a framework may only be effective within a particular window of opportunity or during a particular 'era' of IT use. It is obvious that the business and technology domains have altered considerably since the 1980s when most

of the frameworks that are described in Earl's analysis were developed. The temporal factor also presents problems, as the 'implicit assumption that they [strategy frameworks] exist outside time' is without foundation and an analogy is drawn with navigating by an out-of-date map (Doyle 1991 p. 276). It follows that an obsolete framework may ignore the potential of new technologies and may suggest unsuitable business strategies, producing results that are ineffective or even harmful.

5.5.5 The Environmental Effect of Frameworks

All information systems change their environment as soon as they are introduced to it (Sommerville 1995). With strategic systems the dynamic relationship between system and environment is even more apparent, as the systems are not only developed as a reaction to environmental conditions but will seek to change their environment in substantial ways (Powell 1993). It therefore follows that by their nature the more potent SIS frameworks 'must surely effect the environment that they seek to explain'. Doyle goes on to say that because of this the frameworks 'can no longer explain it' (Doyle 1991 p. 276). In fact most of the frameworks that 'get the widest coverage' (Doyle is perhaps referring to Porter's models) are intended to initiate strategic thrusts that must affect the competitive market and influence the actions of rivals. Indeed the main purpose of strategy frameworks, is not just to explain the environment (this is the function of systems analysis techniques) but to change it (Earl 1989).

5.5.6 First-user Effects in Frameworks

There is evidence to suggest that organisations that are the first to develop strategic IS/IT applications gain the most benefit from them (e.g. Altman 1997, Loebbecke *et al.* 1997, Clemons 1990a, Clemons and Weber 1990, Senn 1992). Doyle assumes that the effectiveness of a framework will diminish over use, as he puts it 'the first user (of the framework) will reap maximum benefit' (Doyle 1991 p. 276). This criticism is difficult to justify, as it implies that a framework is mechanistic and ignores the importance of factors such as vision and creativity in opening up innovative ways to use IS/IT strategically. It could, of course, be argued that it is the imagination of the people who applied the frameworks that enabled the success of the classic SIS/IT applications rather than any properties of the framework itself.

Frameworks of the type described by Earl and Doyle can only support the application of human creativity and can never supplant it. Also, if all the companies in a market have access to the same frameworks, there is nothing to prevent follower companies from matching the strategic performance of a first mover. This move will be successful if they have the vision to differentiate their strategy from that of the first company (King *et al.* 1988).

5.5.7 Frameworks Limit Vision

If frameworks are taken too literally, or if are internalised (becoming the focus of the user's attention rather than the application) they may actually inhibit the pursuit of strategic opportunities. Doyle cites the reluctance of some Western companies to develop just-in-time (JIT) manufacturing systems as an example of this, their vision being constrained by the use of existing production and stock control models (Doyle 1991 p. 276). Again, this would seem to imply a failure of management vision (or perhaps a failure to scan the competitive environment) rather than the inadequacy of the frameworks. Japanese companies were already achieving strategic benefits from such systems and this fact could have been identified by the use of a competition framework such as Porter's ICA model, so that a valid strategic response could have been prepared (Kenney and Florida 1993). Clearly, the strategic potential of a framework is no better than the strategic perception of the people operating it. 'What we know about a problem situation is replaced by what we can explain within the limitation of the framework...when implemented, frameworks focus on specific unambiguous features of systems, and so they are necessarily restricted and restrictive' (Angell and Smithson 1991 p. 36). However, there are well-documented techniques in other disciplines, such as the fields of creative design and problem solving, that have a proven record of encouraging the development of creativity and innovation from groups and individuals (e.g. Wack 1985, Buzan 1985). Creativity and innovation in the field of IS design is also regarded as a legitimate topic of study (Couger *et al.* 1993).

5.5.8 Frameworks are Debilitating

Doyle (1991) contends that frameworks can actually inhibit the ability of individuals to think strategically or to identify strategic opportunities and provides several arguments in support of this view. First, he believes that a reliance on any framework can lead to strategy developers not accepting responsibility for their own actions, leading to, 'a kind of headlessness: lack of confidence, inability to take vital decisions and stifled creativity' (Doyle 1991 p. 277). Second, he feels that far from providing a common ground for communication, the use of frameworks may be an inappropriate means of disseminating a shared vision throughout the organisation. This may result in 'a debilitating sectarian struggle' which is the opposite of the situation where all stakeholders 'feel as if they own not only the problem but also the process by which the solution is sought and implemented' (Doyle 1991 p. 277). In this view, a framework may subvert the process of ownership of a problem by imputing a degree of spurious precision. 'The framework concept itself carries the weight of meaning and authority that is derived from the dominating position of hard science and technology in the mind-set of Western society' (Angell and Smithson 1991 p. 35). This would appear to be a valid criticism of an over-

reliance on the use of frameworks without proper guidance or preparation, and may be compounded by the fact that frameworks are essentially passive. The use of a framework is 'like being told the solution to a puzzle before you try it yourself... thus (it) fails to mobilise an organisation's biggest asset: its collective brainpower' (Doyle 1991). These views are possibly justified where frameworks are used slavishly and taken out of context, but it appears to imply that the purpose of a framework is to produce a deliverable (i.e. the solution). In fact it may be the process of using the framework and the shared experience which this engenders among its users which is important, as is the case with many problem-solving techniques (e.g. Checkland 1988, Eden and Ackerman 1987).

5.5.9 Frameworks Are Over-simplistic

There is a prevalence of two-dimensional matrices that are intended for application to complex, multidimensional problems (Ward 1988a, Macmillan 1986). Attempts to fit reality into a 'two-by-two' matrix appear to be simplistic and reductionist (Nicholls 1995), and may lead to a sparseness and selectivity of information that can, 'obscure...insight and encourage us to distort reality...' (Doyle 1991 p. 277). This is again in sharp contrast with other related disciplines where semantic richness is a feature of many techniques. However, as Doyle asks rhetorically,

Now, admittedly, executives are busy people, and they want a view of the world pared of irrelevant detail, but if you are going to let your strategy-making be guided by a framework, don't you want to make sure it is not just a convenient simplification?

(Doyle 1991 p. 278)

It is also questionable whether frameworks can show anything other than a simplistic, reductionist model of organisational complexity. There is a view that the dynamic and ambiguous complexity of an organisation's future just cannot be reduced to such simplistic data structures, which imply a tidy and convenient homogeneity in organisations which is just not there (Angell and Smithson 1991). The criticism of simplicity would be valid if frameworks are used as single, unconnected techniques, but the same could be said about techniques in other disciplines. The analogy with IS analysis and design techniques would suggest that the real value of frameworks is when used in a rational combination with a defined purpose (i.e. a method or methodology). It is therefore possible to envisage a combination of strategy frameworks representing various aspects of the strategic process, just as many IS development methods seek to capture aspects of a business application.

5.6 A Review of Strategic Frameworks

The problems that confront the practitioner in choosing and using strategic frameworks are not unique to this domain. First, there are many frameworks and they are both limited

in their scope and specialised in their application. This could also be applied to the confusing number of systems analysis and design techniques that have been developed over the years, but some rationality was brought to this situation when they were combined to form IS development methods (Avison and Fitzgerald 1995). Second, the 'management overhead' of making a choice of framework for a given application is one that faces practitioners in other disciplines, and techniques to support the choice of method have emerged in the areas of IS development (e.g. Jayaratna 1994) and IS investment appraisal (Farbey *et al.* 1995a). Third, frameworks are not static or passive entities and they affect their target environment and favour the first user organisation in that environment.

This confirms their stature as strategic, as both of these attributes are notable features of both the strategic processes and of the actual cases of strategic IS/IT applications (King and Saberwhal 1992). Fourth, strategic frameworks are, in effect, management tools and their performance in practice must be linked to the level of skill and the abilities of the individuals who use them. It is difficult to see that frameworks by their nature can limit an individual's ability to think strategically or to identify strategic opportunities for IS/IT applications:

If frameworks are used sensibly, that is to help focus on consequences and not just on intentions, then they can help formulate tactics that will be appropriate within strategic and organisational constraints... However, an approach, valid or otherwise, will come to nothing without the input of a quality individual, the 'thinking manager', who can fully understand the disposition of the organisation and can relate to the compromises being made within the system and thereby cope with its inherent ambiguity.

(Angell and Smithson 1991 p. 36)

It is therefore suggested that there are a sufficient number of strategy frameworks from which a choice may be made to support the various aspects of the strategic systems development process. The frameworks appear to have a sufficient degree of technical and semantic richness, but that it is necessary to have a way of linking and using them in a practical and effective way. Earl's meta-framework is a useful educational tool which categorises frameworks and which 'suggests their relative purposes and merits' in relation to 'management education research and consultancy' (Earl 1989 p. 40). However, it is likely to have limitations as a systematic framework for developing strategic IS/IT applications. It is descriptive rather than methodological and concentrates on the attributes of the categories of framework (i.e. purpose, scope and use) rather than the requirements of the strategic process or the properties of business strategies. Perhaps the most telling criticism of the use of strategy frameworks is the absence of a methodology

for their application in practice, and the study of such methods is therefore the subject of the next section.

5.7 Strategic Systems Development Methods

The literature search into the strategic applications of IS/IT identified a number of approaches that claim to give support to the process of identifying the strategic potential of IS/IT in organisations and developing applications to achieve this potential.. These are collectively identified as strategic information systems planning (SISP) methods (Lederer and Salmela 1996). In view of their range of different features it is necessary to establish some definitions and requirements for a strategic IS/IT development method. With the possible exception of the study of three widely used SISP methods (Flynn and Arce 1995), the SISP literature does not attempt to prescribe or to define the term method. In the IS domain, however, Avison and Fitzgerald (1995) and Lyytinen (1987) have produced suggestions of what they believe to constitute a methodology. These classifications can be combined and simplified to produce a set of features that are required in a method:

5.7.1 Guidelines

It should not be assumed that a developer has prior experience of a particular process or application. Guidelines or 'rules of engagement' are therefore needed to cover the use of techniques, the range and timing of activities and the deliverables that must be produced under different conditions. This is particularly important in the strategic systems domain, as the process of using IS/IT strategically is by its very nature non-routine. The strategy frameworks tend to be published with examples of their use in individual applications (e.g. Parsons 1983b, Ward 1988b), but without the same guidance in their use as applies to proprietary systems development methods.

5.7.2 Philosophy

Lyytinen points out in a definition of an IS development methodology that every such methodology is founded on a set of assumptions which are based upon a underlying principle which is supported by fundamental concepts or theories (Lyytinen 1987). Avison and Fitzgerald state this point somewhat differently when they conclude that a methodology is distinguished from a method (i.e. an ordered collection of techniques) by an under-pinning philosophy that will guide its purpose and application (Avison and Fitzgerald 1995). This philosophy is important in placing the methodology within a taxonomic classification. For instance, human-centred methodologies have a radically different philosophy from structured methodologies and from soft systems methodologies (Lyytinen 1987). A strategic systems development method would involve modelling the dimensions of specific business strategies and identifying opportunities to use IS/IT in support of these strategies.

5.7.3 Relevance to the Practitioner

The problem of developing strategic systems involves the interaction of a wide range of individuals from different functional areas and cultural backgrounds, each having their own characteristics in terms of business and technical knowledge, social and educational background and communications skills (Episkopou and Wood-Harper 1986). Most of the strategy frameworks are from the business domain and use an approach that will be familiar to managers (Ward 1988a) but probably not to technologists. An important function of a strategic systems development method would be to provide an understandable range of techniques as if a method is misunderstood, then it is likely to be misapplied (Hughes and Wood-Harper 1997).

5.7.4 Coverage of the Life cycle

One major difference between strategy frameworks and IS development methodologies is that the frameworks apply to a specific task or phase in the development of a system. The methodologies, however, support a number of tasks, follow a sequential process and have coverage of a defined section of the life-cycle which will vary according to the objectives and philosophy of the methodology. Claims that 'a methodology should cover the entire systems development process' (Avison and Fitzgerald 1995) imply that a strategic IS/IT development method would need to have a greater coverage of the front-end of the lifecycle than a conventional IS development methodology. The primary requirement for a strategic systems development method is to cover the strategic development process and to link this process with the remainder of the development process.

5.7.5 Forecasting and Innovation

A predictive method should contain two further points. First, a systematic way of looking into the future to predict possible changes in requirements and to allow the system to be designed in such a way that the future change can be accommodated. Second, a way of scanning for opportunity so that, 'rather than being viewed as simply a solution to existing problems it should be seen as an opportunity to address new areas and challenges' (Avison and Fitzgerald 1995) which implies some elements of Future Analysis (Land 1982) or flexibility analysis (Fitzgerald 1990).

5.8 Proprietary Strategic Systems Development Methods

The methods that were identified in the literature search as being strategic in nature possess certain consistent features or assumptions. First, that it is possible to define an enterprise-wide systems architecture within which business activities and the IS applications and technology which support them can be integrated (Zachman 1986). Second, that it is possible to identify a portfolio of computer-based applications that will

assist an organisation in executing its business plans and realising its business goals (Lederer and Salmela 1996, Ward 1990). Third, that the management of the information and IT resource is a major strategic concern for the organisation. As such, methods in this category have an internal focus with a resource-efficiency objective that would appear to be out of line with most of the more recent thinking on strategic systems development. Indeed, many of them could be described more accurately as 'methods for developing systems strategically' rather than 'methods for developing strategic systems'. Nevertheless, some of these methods are still used widely in industry and are still reported and discussed in the academic literature and so are worthy of further examination. The methods that are examined are Business Systems Planning or BSP (Orsey 1982), Business Information Control Study or BICS (Flynn and Arce 1995), Information Engineering or IE (Wilson 1995) and Method/1 (Lederer and Gardiner 1992b).

5.8.1 Business Systems Planning

Business Systems Planning (BSP) was developed by IBM around 1970 with the objective of supporting IS planning at the strategy level. BSP follows a top-down waterfall model that is based on the application of a product/resource life cycle that results in the production of an information architecture (Zachman 1986). The approach is based on optimising the management of IS/IT resources as it assumes (indeed hypothesises) that the business under study has a data problem which can be solved by management (Orsey 1982), and seeks to establish function and data models which will be stable over time (Wang 1997). This suggests that BSP is an enterprise-wide data analysis method rather than a strategic systems development method, for the following reasons. First, the main deliverables (or products) of BSP are technically very similar to those of conventional IS development methods and these products and techniques are unlikely to be familiar to individuals from the business areas. Second, the method does not cover the front-end of the strategic systems development life-cycle and does not address strategic problems such as the identification of strategic opportunities and the alignment of the business and IS/IT strategies (Powell 1992). Third, the structure of BSP is not compatible with any of the strategy frameworks that are described in the previous section. Nevertheless, it is well documented, offers guidance and is important for its influences on current data management practices, including a number that are regarded as of strategic importance to organisations. These include enterprise resource planning (ERP) systems (Cooper and Kaplan 1998), data warehouses and repositories (Cheng and Chang 1998).

5.8.2 Business Information Control Study

BICS was developed subsequently to BSP and has certain similarities to the earlier method. However, it draws heavily on a theory called business information analysis and integration technique (BIAIT) which supposes that the IS/IT requirements of an

organisation can be 'architected' given a knowledge of how the business structures its order-processing system. This system is held to be strategic because it is at the core of the business (Burnstine 1986). BICS therefore analyses the customer-centred business processes rather than the abstract data. Although the techniques and products of BICS are similar to those of BSP, the philosophy is decidedly different. BICS is short term, focusing on the relationship between the data and the organisation (rather than processes) in 'a thrust toward quick implementations' at the expense of architectural structures in a bid to 'relieve some current management frustration with the data' (Zachman 1986). This could be seen to make BICS more representative of strategic activities at the front-end of the life cycle, such as the identification of business opportunities and strategic manoeuvres. Second, BICS is generally more business orientated than BSP, giving more attention to the identification and solutions to business problems. Its approach (if not its techniques or deliverables) should be more relevant to business users than technical practitioners. Third, BICS is more process-driven, assuming that processes have an importance to the organisation that is equal to that of data and offers at least the same guidance to the practitioner as BSP.

5.8.3 Information Engineering

Although BICS is superior to BSP in the respect of its coverage of the front end of the lifecycle, there is no doubt that both of the above methods are limited in their penetration in this area. Both tend to focus on the technical environment rather than the business environment and this approach can perhaps be attributed to the philosophy of information management that prevailed at the time they were developed. Later approaches to enterprise analysis developed spontaneously from a fusion of the works of Martin and Finkelstein (1981) and Palmer and Rock-Evans (1981) and produced a family of data analysis methodologies which resulted in the formalisation of the Information Engineering (IE) method (Wilson 1995). The IE method is promoted as a practical and applicable method of strategic systems development that 'bring[s] the business and its inherent underlying structures into the process of information systems development' (Davids 1992). A thorough coverage of the front end of the strategic systems lifecycle is claimed from the method (Kurbel *et al.* 1994) although the business planning process:

Is not, strictly speaking, part of the IE methodology, as it would normally be performed by corporate management and planners. However, it is recognised as a fundamental starting point for the methodology. It implies that the organisation's information systems should be designed to help meet the requirements of the corporate plan and ...are of strategic importance to the organisation.

(Avison and Fitzgerald 1995)

The strategic content of IE is represented by a phase called Information Strategy Planning (ISP) that seeks to analyse the strengths and weaknesses of the organisation's systems, its information strategy plan and its information architecture (Wang 1997) and the information requirements of its executive. The aims of this stage are:

To link an organisation's mission, objectives, and the critical success factors it recognises for achieving them to an Information Strategy that supports the organisation in realising its goals...To propose Systems Design Projects that relate potential system solutions to the organisation's mission, objectives and main critical success factors.

(Davids 1992 p. 13)

The next phase is Business Area Analysis (BAA), which takes an architectural approach to systems analysis based on an IS plan which 'flows out of and is closely aligned with the organisation's Business Plan...' (Davids 1992). One feature of this phase which may impact on the business strategy process is the task of confirmation in which, 'Hypotheses concerning business changes are...examined to see what effects these might have [upon the systems]' (Avison and Fitzgerald 1995). The techniques and deliverables that are involved at this stage are informal but should be familiar to individuals who are used to business analysis and strategy setting.

The result of this exercise is a socio-technical design exemplified by Business Systems Design (BSD) and Technical Design and Construction (TD and C) phases which use models based on normal analysis and design techniques such as entity-relationship models, data flow diagrams and a variety of referential matrices. As with BSP or BICS, these techniques are similar to those used in other IS development methods. The IE method has a business-focused front-end phase grafted onto a considerably more substantial technical stage framework. There are examples in the literature of IE being used successfully with a variety of applications (e.g. Finlay and Mitchell 1994). However, these examples are not strategic applications of IS/IT and, although it does address some of the strategic issues, the ISP phase does not offer practical techniques to support the user-centred aspects of the first part of life cycle (Beath and Orlikowski 1994). These features are, however, contained within Anderson Consulting's Method/1, as is discussed in the next section.

5.8.4 Method/1

Method/1 is more recent than IE and attempts to provide a greater degree of coverage of the business strategy process than other SISP methods. As well as defining an overall IT strategy Method/1 seeks to, 'find new opportunities for using information to achieve a competitive advantage' and its planning processes are much like any other corporate strategic planning effort (Lederer and Gardiner 1992b). However, Method/1 is a planning

approach, rather than a development approach. It has ten stages (or work segments) of which the last five produce plans relating to the organisational, technological and data/information issues. The deliverables are in the form of summaries, recommendations and checklists that can communicate the system conceptual requirements to the project team. The second segment is Business and Competitive Assessment and has the philosophy that, 'Although a strategic information plan deals extensively with technology, it is equally important [if not more so] that the plan embody the organisation's current and future business environment' (Lederer and Gardiner 1992a). There are three key activities in this segment. First, the need to understand the business strategy and competitive environment, second, identifying the implications of the environment (e.g. the opportunities and threats to the organisation) in order to suggest strategic applications of IS/IT, and third, defining the strategic information needs which will allow these opportunities to be achieved. Method/1 uses a variety of the ICA framework (Porter and Millar 1985) and the PEST analysis technique (Robson 1997) to identify opportunities,

The organisation can gain this advantage by altering industry structure, improving present business or creating new business opportunities, the strategic information systems planning process must include a search for the means of using information to accomplish these types of results. In addition, the team can use these identified opportunities to determine strategic information needs that were not recognised previously.

(Lederer and Gardiner 1992b p. 16)

This external orientation at the beginning of the development process is a significant difference between Method/1 and other SISP methods, and this highlights a number of disadvantages of the proprietary methods and frameworks when applied to the development of strategic IS/IT applications. Method/1 has the advantage of a 'lifecycle' that consciously links the creation of the business strategy (in the Scope Definition and Organisation work segment) to the development of the IS/IT application (in the Project Definition and Planning segment). The balance of business and technology assessments that the method offers is attractive. For instance, the method contains 'front-end' business-oriented activities called Business and Competitive Assessment, Present Status Assessment (i.e. work segments 2 and 3) that link to 'technological' activities called Data and Applications Planning, Technology Planning and Information Action Planning, through the 'central' activities of IT Strategy and Organisation Planning. Through these activities 'an organisation can develop a vision of business solutions that involves information technology and an overall approach for migrating towards the vision' (Lederer and Gardiner 1992b).

All of these SISP methods have advantages and features to recommend them. There are, however, criticisms of the methods in practice. These are examined in the next section.

5.9 Criticisms of Strategic Development Methods

An informal examination was made of the features of strategic systems development methods, and a comparison was made: first with the generic set of requirements for a method and second, with the features which are needed to support the business strategy process (see Chapter 4). This leads to the identification of a number of shortfalls of many of the current strategic systems development methods:

5.9.1 Weakness at the Front End of the Life Cycle

It is apparent that SISP methods such as BSP and BICS do not cover the front-end of the strategic systems development life cycle, as the initial phase of both methods is based on an analysis of existing systems rather than a strategic analysis of the environment. This deficit is overcome by IE, which deals with the business planning process but does not cover the conventional business strategy process (Avison and Fitzgerald 1995). Method/1 goes further in addressing this area with its Business and Competitive Assessment phase (Lederer and Gardiner 1992b) and shows an acceptable balance between the business and technical areas. The literature survey into business strategy (see Chapter 3) identified that the development and promulgation of a business vision is important at the 'business end' of the life cycle, and none of the methods (including Method/1) appear to have the creative emphasis that supports this activity effectively.

5.9.2 Lack of a Strategic Context

Methods such as BSP and BICS lack a business strategy context in that they do not address explicitly such strategic issues as competitive advantage or alignment with the business strategy. Being more concerned with information resource management issues they do not contain techniques for environmental scanning, opportunity spotting or developing strategic manoeuvres. Neither method is compatible with the strategy frameworks that are capable of carrying out these functions. IE also treats information as an important strategic resource and does suggest that a linkage with the business strategy process should take place. However, it does not offer techniques for making this operational. Method/1 offers more promise, as it claims to be strong in its strategic context through the use of scope definition and competitive assessment (Lederer and Gardiner 1992a). However, Method/1 does not explicitly support two of the strategic factors that are identified (in Chapter 3) as being important in the strategic context of systems linkage, (i.e. the development of the business vision and the alignment of business and technical strategies and infrastructures).

5.9.3 Incompatibility with the Business Strategy Process

A strategic system development method should be capable of supporting the strategy development process and the elements which have been identified (see Chapter 4) as important components of a balanced business strategy (e.g. strategic positioning, strategic vision and strategic flexibility). BSP, BICS and IE make no attempt to model or to support these features, although their architectural approach may indicate an attempt to promote flexibility. One of the most basic requirements for a strategic systems development method is the ability to fit in with the way in which an organisation develops its business strategy. Method/1 is claimed to do this by following through a series of steps that are intended to achieve five distinct objectives (Lederer and Gardiner 1992b). However, the literature search into business strategy (see Chapter 3) indicates that the business strategy process is more complex than could be supported by a series of discrete stages. The process by which business strategies are created is often iterative in nature, and frequently involves a 'balancing act' involving the simultaneous interaction of several components. Method/1, being essentially linear, (although there is provision for extending the duration of the segments to suit more complex projects), would not fit comfortably into such a process.

5.9.4 Technical Emphasis

The structure and many of the techniques which make up the BSP, BICS and IE methods are similar to those which are used in conventional IS development methods, such as entity-relationship models, data flow diagrams and referential matrices (Flynn and Arce 1995). The majority of the phases in both BSP and BICS are intended to deal with current systems analysis, design and specification, so they can be considered as having a technical emphasis. IE and Method/1 take a more balanced approach, with some of the techniques being more business oriented and a greater proportion of the systems life-cycle being devoted to non-technical activities. Method/1 has a particularly even balance over its ten work segments, although it is clear on inspection that the method does not have the necessary richness of technique over the whole range of its business analysis phases, particularly in support of business vision and strategy alignment.

5.9.5 Lack of Richness

The methods that are reviewed here have some advantages over the basic strategic frameworks (see Chapter 4), in that they support the techniques with a philosophy in a way that increases their effectiveness. However, by definition, many of the existing SISP methods (e.g. BSP, BICS and IE) relate to the planning and management of IS/IT application portfolios, rather than the development of specific strategic IS/IT applications.

This leads to the methods being very general in approach, and it is felt that they consequently lack the ability to capture the richness of information that is required to support the strategic components that have been identified as parts of the strategic linking process. Several of the activities that make up Method/1 contain some techniques that provide the necessary richness (e.g. Porter's ICA model and SWOT analysis). It is felt, however, that the benefits of the techniques themselves do not warrant the adoption of the overall Method/1 approach as a strategic linking method. The techniques are common to other areas of business analysis as 'stand-alone' analysis and communication techniques, and it makes sense to use them in a model that is more suitable to the application.

5.9.6 Lack of Support for the Strategic Components

In the literature search into business strategy (see Chapter 4) a number of components are identified that appear to be important in the process of linking the creation of a business strategy to the strategic IS/IT application development process. These are; strategic vision, strategic positioning, strategic flexibility, strategic alignment and value chain integration. Method/1 offers clear support for strategic positioning (through the Business and Competitive Assessment work segment), and Method/1 and IE have properties that can support the development of flexible systems (e.g. the IT Opportunities segment in Method/1. However, none of the existing methods contain activities and techniques that would support all (or even a majority) of the required strategic components. From the perspective of the present research, this point is telling. It is hypothesised that the relationship between these important strategic components (and therefore the strategic linking process) is complex and iterative. If this is true, the strategic systems development process is unlikely to be supported by linear planning methods, no matter how effective the individual techniques that they contain. Clearly, if it can be shown that these components (and the characteristics of the process) are important, there is scope for developing a method for linking business strategy and the development of strategic systems.

5.10 Summary

The literature search in this area explores several points which, when combined with the findings of the survey of the business strategy development process (see Chapter 4) and the examples of strategic applications of IS/IT (see Chapter 3), provide the following conclusions that have important implications for the research. First, although the existing range of strategy frameworks is rich and varied and individual frameworks exist which are capable of capturing the key aspects of business strategy, there is a need for a structure to give guidance for applying the frameworks in a way which supports the strategic process. Second, the existing SISP methods have deficiencies in important areas, including

compatibility with the strategy development process and support for the identified strategic components. This leads to the conclusion that there is scope for developing an alternative strategic linking method that has the necessary properties. The research now moves on to examine industrial practice in relation to the importance of the strategic components (e.g. strategic positioning, strategic flexibility, strategic vision and strategic alignment) that were identified in Chapter. The role of these components in linking a business strategy to the strategic systems development process serves as the basis of the hypotheses that are examined in the next chapter. It was decided to include the fifth component (i.e. value chain integration) in the set of hypotheses, although this component resulted from the researcher's expectations and had not been confirmed as being important in the literature survey in Chapter 4.

Chapter 6

Design and Analysis of Survey Instrument

In Chapter 2 the factors that influence this research project were identified and the research approach was described. In the next three chapters the research domains were explored by secondary research and some important concepts were defined. This allows some research questions to be formed and research hypotheses to be stated, which is done at the beginning of this chapter. The rest of the chapter is about the primary research that seeks to test these hypotheses. The design of the data gathering instrument is discussed and the selection of a sample population are described. A basic univariate analysis is used to test the hypotheses (Babbie and Halley 1994) and also to provide information on which the main research contribution can be based.

6.1 Developing the Research Hypotheses

A research hypothesis may be derived directly from a basic set of research questions and is either a guess at or a declarative proposal for a solution (it may be one of many such solutions). The hypothesis must be fundamentally new, not having been tested before in relation to the particular research domain, although it is perfectly valid to use a hypothesis which has been used before in a different domain to provide a latitudinal analysis, for instance to compare practice in two different industries. The hypotheses that are proposed for use in this research have not been encountered in the literature search of many journal publications and conference and research project deliverables reveals. It is therefore valid to test them and is a worthwhile contribution to the body of knowledge in the domain. The hypotheses must be framed in such a way that they are capable of being verified or tested and proven, positively or negatively. This implies that the body of knowledge that is being explored in the literature search is capable of being compared with or validated against another part of the research domain. This is usually either another body of literature, a situation that occurs in a different context or time period or a scenario from the real world. This research project seeks to draw hypotheses from the literature and to test them against practice in a range of top UK companies. This is considered to be a valid test of the research hypotheses.

6.2 The Research Questions and Hypotheses

Much of the literature relating to the strategic application of IS/IT is in a US context, although the movement of strategic systems onto the World Wide Web (e.g. American Airlines' Sabre) marks a significant change by making geographical location less important. In a series of six annual surveys carried out in the US by the CSC Index

Foundation between 1988 and 1994, the use of IT for competitive advantage has appeared consistently in the 'top twenty' issues. It was placed in the top position in 1989, although its position declined to fifteenth in 1994 (Boar 1994). In a survey published by Datamation magazine in 1994 which questioned IT managers about their perceived key issues the issue of strategic systems was placed in sixth position, 13% of respondents feeling that 'using IT to develop competitive advantage' was critical, and 38% feeling it to be 'very important'. In a survey carried out every four years in the US, respondents from the Society of Information Management (SIM) identified the issue of competitive advantage to be a significant concern. It appeared in second position in 1986 and staying in the top twenty issues of greatest concern in later surveys (Brancheau *et al.* 1996, Neiderman *et al.* 1991, Brancheau and Wetherbe 1987). This suggests that there is a convincing case for re-examining the links between business strategy and the strategic application of IS/IT in a new and different context. The application of the chosen research methods to the researcher's empirical experience and to the findings from the literature search prompts the framing of three research questions, as follows:

6.2.1 Research Question Q1

Do successful UK companies develop strategic IS/IT applications, what is their definition of such systems, and to what extent do such companies attribute their success to the links between their business strategy and their IS/IT applications?

6.2.2 Research Question Q2

Do the successful UK companies that develop strategic IS/IT applications regard as important the components of business strategy, termed strategic positioning, strategic flexibility, strategic vision, strategic alignment and value chain integration, when developing IS/IT applications to support business strategies?

6.2.3 Research Question Q3

What techniques are available for developing strategic IS/IT applications, are any such techniques used by the UK companies and could the use of strategic IS/IT development techniques be improved by the use of an integrating framework?

These research questions prompt the formation of the following hypotheses:

6.2.4 Hypothesis H1

UK companies that can be considered as successful in a variety of business sectors do define and develop strategic IS/IT applications, and such applications do make an important contribution to their commercial success.

6.2.5 Hypothesis H2

Successful UK companies do consider the aspects of business strategy, termed strategic positioning, strategic flexibility, strategic vision and strategic alignment, to be important components of the linkage between business strategy and the development of strategic IS/IT applications. The same companies do not regard value chain integration as an important component of this linkage.

6.2.6 Hypothesis H3

There are published techniques which can be used for linking business strategy and strategic IS/IT applications, such techniques can be combined to support the aspects of business strategy termed positioning, flexibility, vision and cohesion or alignment, and these aspects can form a framework for developing strategic IS/IT applications.

6.3 Testing the Hypotheses

The research hypotheses can now be tested using data gathered from primary research into industrial practice. This part of the research has three phases. First, test construction, which deals with the design of the test instrument. Second, test application or sampling, which involves the distribution of the instrument to a population which will allow a representative test of the hypotheses. Third, test evaluation, which deals with the analysis of the responses, the explanation of the results of the analysis and the stating of the conclusions which may be drawn from the analysis. These tasks are described in more detail in the following section:

6.3.1 Test Construction

In order to construct a valid instrument for testing the research hypotheses, the researcher must be clear about the purpose of the test and the type of validity that is to apply to the particular test. Test construction involves the researcher in design at two levels: at the highest level, the design of the test instrument that involves the whole questionnaire and the way it is applied, and the test items - which involves the individual questions and the way they are interpreted (Belson 1982). Research items may be placed in the objective or non-objective categories, according to the approach to scoring the tests. A questionnaire (instrument) for use in this domain will have a mixture of the two types of test. First, objective tests, which are framed in such a way that the rules by which the tests will be scored are well defined and there is, in theory, no latitude for interpretation or personal bias on the part of the scorer. Second, non-objective tests in which the scoring will be subject to the personal values and perceptions of the scorer. Objective tests are capable of precise analysis and provide a high degree of control over the research variables (Belson

1982). However, there is a limit to the richness of the data which may be gathered by such methods and there is the risk of influencing the response through the structure of the questions. Examples of objective test items include multiple-choice questions and the use of rating scales (e.g. Likert scales) which are commonly used in research instruments in the social sciences and are felt to be suitable for use in the present research (Salkind 1997). The point of non-objective tests is that they allow the respondent to provide an answer in any form which he or she feels is appropriate, or simply to supply the necessary information by his or her behaviour or actions in response to research situations. Examples of non-objective tests include observations, interviews and open-ended questionnaire items which are capable of indicating a greater semantic richness and to convey extra levels of meaning when compared to objective tests (Marshall and Rossman 1995). In some ways these techniques are so subjective that they are not true tests in the commonly accepted sense. However, all are capable of capturing detailed information, and are often the only way of obtaining qualitative data from research subjects (Belson 1982). This is important to the present research.

6.3.2 Test Application

The test instrument will therefore be made up of a mixture of selected test items in a form that is appropriate for testing the research hypotheses, and the instrument must then be applied to appropriate subjects. This will involve important choices in two areas: firstly, the data gathering or primary research method and, secondly, the sample population to which the test instrument will be applied (Marshall and Rossman 1995). The techniques of data gathering will relate to the nature of the research hypotheses and will be applied within the context of an appropriate research method (see Chapter 2). After considering the common data gathering techniques of observation, interviewing and the use of questionnaires, it was decided to use a questionnaire to gather the data. This decision was taken for the following reasons:

- This stage of the research project is not suited to the use of observation and/or interviews as methods of data gathering. The research qualifies as *ex post facto* research as its objective is to establish the opinions of influential people in leading organisations about developments which have taken place in those organisations;
- A survey of industrial practice implies a latitudinal study comparing differing strategic practices in a significant number of companies that exhibit latent similarities in their structure, industry sector or characteristics. A postal questionnaire is an effective method of carrying out such a survey;
- The use of a questionnaire makes for a high degree of control in the research environment and, if designed correctly, questionnaires can provide consistent, reliable responses from a population that is difficult to reach by other means.

A questionnaire has the advantage of reaching a larger sample population (which will increase the degree of generalisation of the data) but may be relatively inflexible in use. It will be necessary to ensure that a sufficiently high rate of return has been achieved to form a representative sample and that the target population represents a typical sample (Salkind 1997). The form of internal logic that governs the integrity of design of the research instrument is termed internal validity (Campbell and Stanley 1963). A research instrument is said to have internal validity when it provides a consistent and adequate set of tests of the research hypotheses. While the concept of internal validity deals with the design of the research instrument, external validity describes the extent to which the results of a test may be extended or extrapolated to apply to other samples from the same population or other populations in the domain. An experiment or survey is internally valid when its results are consistent within its own confines, but for those results to be useful they must be capable of being generalised into the non- experimental domain (i.e. it must have external validity). The aim of the data gathering exercise is therefore to achieve a balance between internal validity (through test and instrument design) and external validity (through the application of the instrument to a valid population).

6.3.3 Choice of Sample

Sampling is the act of choosing a section of the overall survey population to which the survey instrument may be applied, which will produce the same results from the tests as would the whole population. A sample which will produce the same results is said to be representative, whereas an unrepresentative sample is said to be biased and will lead to inappropriate conclusions being drawn about the population as a whole (Salkind 1997). An ideal sample is therefore one which is neutral (i.e. chosen randomly) and in which the characteristics of the sample will not influence the results of the survey unduly. This may be achieved by the use of an appropriate sampling technique, and random sampling, systematic sampling, stratified (random) sampling, and cluster sampling are common ways of making a data gathering exercise more manageable. The use of random sampling implies that it is not possible or necessary to approach the whole of an available population, and the use of systematic, stratified, quota and cluster sampling implies that enough is known about the target population to categorise or organise it in some way. In any case, all of the above sampling techniques are vulnerable to the problem of a poor return rate, which may compromise the external validity of the population if the sample is further reduced to an unacceptably small size. In effect, providing the returns are unbiased and random in themselves, the returns will be effectively self-sampling. In terms of the present research, it is felt to be possible to reach the whole of the target population, if that

population is in the region of 800-1,200 companies, and possible representative populations in this range were examined.

6.4 The Research Population

The literature review of the domain of strategic IT showed that many of the published cases exhibited two characteristics. First, the systems which are most frequently examined are based in the United States of America and second, the surveys are longitudinal, using case-studies or action research to describe the experience of developing SIS in a limited number of organisations. In line with the objectives of the research, the sample for the present research was selected to include a wide range of organisations (to allow a 'latitudinal' survey of industrial practice) in the United Kingdom. Therefore a research population was selected which represents UK companies that are linked by a common factor, which relates to the strategic use of IT, and from which a representative sample could be drawn. It was decided that the common factor that linked the population would relate to the success of the companies in the population, since one of the research hypotheses states that the strategic use of IT is a significant contributor to business success. Data are available from Companies' House of all companies registered in the UK. It was felt that this population would be unwieldy and, although it could be reduced to a manageable size by cluster sampling or stratified sampling. It was felt that the preponderance of small companies would bias the sample and such companies are not likely to have developed strategic IS/IT applications because of their size or resource base.

6.4.1 Selection Criteria

Therefore a population was selected that included companies from a range of business sectors which exhibited characteristics which defined them as market leaders or successful. The problem was deciding upon the best way to value a company or to measure the size or success of a business accurately. There are many criteria which are available and which are used routinely to produce the lists of successful companies that are published regularly by newspapers and (in the UK.) by the Stock Exchange. Such lists are dominated by the use of turnover - the invoiced value of goods or services provided excluding value-added tax (VAT) charges and other duties - as a measure of rank. This measure had '...alluring advantages over other criteria. It was relatively simple to compile: it was a figure provided by the companies themselves and it would be universally understood by readers from all walks of life' (FT Extel 1996). Other common inclusion criteria that can be used for forming lists of successful companies include the following:

- **Profit before tax**, which is defined as the profit before deducting the tax charge;
- **Market capitalisation**, which is defined as total capitalisation at the date of the most recently available balance sheet (usually the previous end-of-year accounts);

- **Number of employees**, which shows the average number of full-time equivalent employees during the previous accounting period;
- **Profit before interest and tax**, which is defined in a similar way to the above but taking into account repayable interest on loans and overdrafts;
- **Total assets**, which gives the total of the company's assets at the date of the most recently available balance sheet;
- **Return on capital employed**, which is defined as the latest profit before tax plus the latest finance charges divided by the previous year's capital employed.

Such measures provided populations which were biased, for several reasons, firstly, certain important financial institutions - such as building societies, insurance companies and most banks - were excluded from the list because the generally-agreed definition of the measure of turnover does not apply to them. Secondly, the use of turnover as a measure for inclusion in the list tended to favour traders and agents - such as commodities traders and advertising agencies - whose billings (on behalf of clients) have the effect of over-inflating their turnover. Equally, other inclusion criteria may be equally unreliable. Measurement of pre-tax profit, for instance, can vary considerably without affecting the underlying size of the business or relating directly to factors that may be influenced by the use of IT. To include companies with a high market capitalisation could possibly rule out the larger unlisted (private limited) companies, which may rely upon strategic IT applications to the same extent as similarly sized public companies.

To assess an organisation for inclusion in the survey by its number of employees (a common way of categorising companies) is equally illogical, as it favours labour-intensive businesses against high-technology ventures.

6.4.2 The Chosen Population

It was therefore decided that the list that would be used as the research population was the 'Times 1000 Companies' list produced by the FT Extel organisation. This was compiled in 1996 according to a new formula (the previous list was based on turnover) which is claimed to produce a measure of industrial predominance which is, '...more relevant than ever to the needs of industry, to researchers and to students' (FT Extel 1996). The formula which researchers at FT Extel produced is a variant of capital employed - defined as shareholders' funds plus long-term loans (debts) plus inter-group payables plus deferred liabilities less certain reserves (e.g. technical reserves for insurance companies). The 1996 edition of the Times 1000 list also provides additional data about the top companies that may be of use in the present research, most importantly the names of senior directors and a full address.

This data alone makes the Times 1000 list more researchable than many of the other lists of companies since it provides an individual - a designated officer - to whom a survey questionnaire may be addressed and to whom subsequent enquiries may be directed. Even so, the use of the Times 1000 list as a target population for the research was expected to raise the following technical and practical problems, which have the potential to lower the response to the survey:

- Some of the firms included are holding companies (i.e. they are companies which make a profit by owning other companies) and therefore may not themselves develop or operate strategic IT applications. In some cases this may result in the questionnaire being 'lost', but it is hoped that at least some of the questionnaires from such companies will be forwarded to an appropriate subsidiary company;
- The designated officer - often the Chair or Chief Executive - may be remote from the function of IS /IT strategy, and may know little about the day-to-day planning and operation of IT systems in their company, and possibly even little about the business strategy. In some cases this may also result in the questionnaire being 'lost', but again it is hoped that at least some of the questionnaires from such individuals will be forwarded to an appropriate person;
- It is not possible to tell this from the company details, but the address that is given for some companies may apply to a registered office which is separate from the business operations. This may make the delivery of the questionnaire to an appropriate respondent difficult.

It will be seen that these risk factors are largely mechanical in nature and may seem trivial, but nevertheless they are important constraints that must be taken into account when designing, implementing and interpreting the research instrument. It is accepted that these factors will reduce the number of questionnaires returned. A review of the results of similar surveys suggests that a rate of return of *circa* 20% would be reasonable for this exercise (Salkind 1997), although it is accepted that many of these respondents will not participate in the survey for a variety of reasons.

6.5 The Research Instrument

It was decided that the primary instrument for the research would be a postal survey using a questionnaire distributed to all the companies in the Times 1000 list that are based in the UK. The resulting questionnaire has five sections, each of which explores a different aspect of the research. Some questions employ a rating scale (a modified Likert scale with four alternative positions) and others use modified 'true-false' (actually 'yes-no') questions or multiple-choice questions according to the characteristics of the tests. Open-ended questions (giving the respondent an opportunity to volunteer extra or

‘unprogrammed’ information) are used where appropriate, but their use is restricted to prevent the analysis of the questionnaire from becoming difficult. The sections are as follows:

6.5.1 Personal Details

It is necessary to record information about the respondent’s role and position in the organisation and experience and involvement in the strategic process. This is useful for referencing the responses so that follow-up and confirmation of facts relating to the first survey is possible and so that the second survey (i.e. the validation exercise) may be carried out. The section also provides important information about the participant’s level of responsibility, position in the company and involvement in strategy setting. Personal confidentiality is respected due to the sensitive nature of the survey.

6.5.2 IS and IT in the Company

This section is intended to assess the company’s approach to IS/IT in terms of the planning, development and operation of the IS/IT functions and to establish the participant organisation’s experience in managing and deploying its IS/IT resources.

6.5.3 Strategic and Market Factors

The rationale for including this section is to find out about the environment and market in which the subject organisation operates and its attitude to IT and the strategies which it adopts to use IT in response to market pressures.

6.5.4 Strategic Application of IS/IT

This section is designed to establish the respondent’s definition of the term ‘strategic’ in relation to IS/IT and the subject organisation’s approach to and experience of developing IS and IT applications which are of strategic importance.

6.5.5 Development of the System

The purpose of this section is to record the organisational experience of developing the strategic IS/IT application and the respondent’s assessment of the development process, including such techniques as may have been used. The full research questionnaire, including the information that was given to the respondents, is included in Appendix D. The instructions request the recipient to forward the questionnaire to the most appropriate respondent within the organisation. This is intended to preclude the problems that are identified earlier in the chapter and to maintain a viable level of response. The list contained 39 companies whose addresses were overseas, and these were eliminated from the sample. Finally, 961 questionnaires were sent out.

6.6 Analysis of the Research Instrument

The total number of questionnaires returned was 204 out of the 961, of which 8 were declared invalid. This leaves a return of 196, which equates to 20.8%, which can be regarded as average for this type of survey. Of the returned forms 130 did not wish to participate in the survey, leaving 66 responses that are capable of being analysed. Although this is a low figure, it is felt to provide a satisfactory population on which to examine the research hypotheses. It is interesting to examine the reasons for this non-participation figure and the motives behind the returned forms. It is unusual for respondents to go to the trouble of returning a questionnaire to say they do not wish to participate in a survey.

This is interesting in its own right and must be seen as a conscious gesture. Indeed, some of the respondents had enclosed a letter giving their reasons for not wanting to take part. A large proportion of the others had scribbled their reasons on the front sheet or the covering letter. Sixty respondents had just returned the questionnaire declining to take part without giving a reason, although they had revealed their identity. It was decided to contact a sample of 20% (i.e. twelve) of such respondents by telephone, to ascertain their reasons for not wishing to provide the required information. The results were incorporated into the other data (made up of 82 responses), and a breakdown of the reasons is as follows:

Company or personal policy not to participate in surveys	5
Not prepared to divulge sensitive or confidential information	28
Strategic issues too important to discuss or disclose	39
Would not know where to find information or contact person who would know	2
Questionnaire is too large, too difficult or would take too much time to complete	8
Total	82

Clearly, the nature of the subject of the survey is a deterrent to providing the requisite information. The respondents who were contacted by telephone (albeit some time after the original survey) were very apologetic and indicated that although they supported the survey they were not prepared to commit their organisation's sensitive information to it. Some stated explicitly that they had returned the questionnaires (rather than simply not responding) because they had feelings of guilt, or sympathy for the researcher. Clearly, the promise of personal and corporate anonymity given in the covering letter was not effective in overcoming their caution. Nevertheless, a substantial majority of individual participants (64.5%) elected to remain anonymous in any publications resulting from the

survey, and a large majority (83.9%) wished for the identity of their organisation to be disguised. In both cases the wishes of the respondents will be respected in reporting the results of the data analysis. The sample population is taken to be the 66 respondents who wished to participate in the survey, of whom 28 gave their permission to be used in a more detailed follow up survey. This is a small sample, but is sufficient to produce meaningful results, especially as the survey is a supporting part of the research rather than the main part. The returned forms can be classified as follows:

Did not wish to participate in the survey	130
Returned by Post Office ('gone away', 'not known at this address' etc.)	8
Participated in survey, did not wish to be involved in a follow-up survey	38
Participated in survey, agreed to be involved in a follow-up survey	28
Total	204

The collected data was analysed using SPSS® for Windows™ software (Babbie and Halley 1994). In order to use the package it was first necessary to define the data in terms of research variables. This was done by associating a variable with each question, thus allowing a univariate analysis to be carried out as described in the following section:

6.6.1 Personal Details

It is necessary to identify the participants in the survey and to obtain some personal details. This is to find some basic facts about the management level at which strategies are developed, and for which strategic activities the respondents are responsible:

1a. The Respondent's Job Role or Function

This question seeks to find out the job role or function of the individual participants in the survey. The variable was given the name JOBROLE and the SPSS® analysis produced the following table.

Value label	Freq	%	Val%	Cum%
Chief executive officer	8	12.1	12.5	12.5
'Board-level' or strategic manager	40	60.6	62.5	75.0
'Middle', line or tactical manager	12	18.1	18.7	93.7
Advisor, consultant or 'staff' role	0	0.0	0.0	93.7
Other ('MD', General manager' etc.)	4	6.1	6.3	100.0
Not answered	2	3.1		
	----	-----	-----	
Total	66	100.0	100.0	

Valid cases 64 Missing cases 2

The majority of the designated officers to whom the questionnaires were originally addressed were at the highest ('chief executive') level, but a significant proportion of the questionnaires had been redirected to individuals at the second ('board or strategic') level. In these cases it may be assumed that the second level respondents are the best people to complete the survey.

It is clear, however, that a large majority of the respondents are sufficiently senior to answer the questions regarding strategy with some degree of authority. In fact 75% of the respondents are at senior board level and this is held to ensure internal validity to the ensuing results of the survey.

1b. Respondent's Level in Organisation

This question measured the number of reporting levels between the respondent and the highest level of organisation. This was given the variable name REPLEV and the SPSS® analysis produced the following table:

Value label	Freq	%	Val%	Cum%
Respondent is at highest level	26	39.3	40.2	40.2
One reporting level	24	36.4	37.6	77.8
Two reporting levels	10	15.1	15.7	93.5
Three reporting levels	4	6.1	6.5	100.0
Four or more reporting levels	0	0.0	0.0	
Not answered	2	3.1		
	----	-----	-----	
Total	66	100.0	100.0	
Valid cases	64	Missing cases	2	

The data indicates that the survey respondents are placed at the top level or at one level below in 77.8% of the participating organisations. This data provides increased validity to the information given in response to question 1a.

Clearly the sample is authentic in that it contains a majority of people who may be expected to have knowledge of and involvement in the strategic process(es) in their organisations. It is therefore likely that useful information will be produced by the questionnaire and identified in the analysis. This information can be augmented by the responses to the following question (1c), in which the types of strategy with which the respondents are involved are identified.

1c. Respondent's Strategic Responsibility

All of the respondents to the survey identify themselves as having responsibility for developing or managing a strategy in their organisation. The main or primary type of strategy operated by the organisation is identified here by the respondents. The variable name STRATYPE was given and the SPSS® analysis produced the following table:

Value label	Freq	%	Val%	Cum%
The business strategy for a conglomerate	4	6.1	6.1	6.1
The business strategy for a single company	8	12.1	12.1	18.2
The IT infrastructure strategy	22	33.3	33.3	51.5
The IS applications strategy	26	39.4	39.4	90.9
A 'functional' (non-IS/IT) strategy	6	9.1	9.1	100.0
Not answered	0	0.0		
	----	-----	-----	
Total	66	100.0	100.0	100.0
Valid cases	66	Missing cases	0	

This shows that a minority of the subjects (18.2%) had the main responsibility for setting or managing a business strategy in their organisation, and the majority of these (12.1%) related to a single company or SBU. A majority of subjects (72.7%) had responsibility for technical (IS/IT) strategies, with a small majority of these being responsible for the IS strategy. This indicates that there is a high degree of technical which is not be matched by the respondents' expertise in linking a technical strategy to the business strategy.

1d. Respondent's Involvement in Strategic Activity

This question seeks to extend the information in this area by finding out the extent of the participants' regular involvement in (as opposed to responsibility for) strategic activity. This was given the variable name STRATINV and the SPSS® analysis produced the table that follows. The data shows the percentage of the responding population that was involved in each activity as a main strategy, and the stated degree of involvement of participants in business strategy activities. The responses to this question give several important pieces of information. The most common types of strategic activity are the alignment of the organisation's business and IS/IT strategies (96.8% declaring 'much' or 'some' involvement) and the alignment of the organisation's IT strategy with its IS strategy (93.6% declaring 'much' or 'some' involvement). From this it is deduced that the responding population is more familiar with technical strategies. However, although the degree of involvement with setting the business strategy is lower (63.7% declaring 'much' or 'some' involvement), an individual analysis that many of the 'technical' senior

managers (cross checked by reference to the ‘personal details’ at the beginning of the questionnaire).

Value label	Much	Some	Little	None	Row total
Setting the organisation's corporate or business strategy	24 38.4%	16 25.3%	18 28.5%	5 7.8%	63 100%
Aligning the organisation's business and IS/IT strategies	47 74.2%	14 22.6%	2 3.2%	0 0.0%	63 100%
Aligning the organisation's IT strategy with its IS strategy	46 73.0%	13 20.6%	2 3.8%	2 3.8%	63 100%
Aligning a another functional strategy with the IS/IT strategies	10 22.2%	14 16.0%	16 25.3%	23 36.5%	63 100%
Column total	127	57	38	30	252

Number of missing observations 3

Significantly, all of the respondents were involved in aligning the IS/IT strategies with the business strategy. This is of central importance to the research in that it indicates a high level of strategic responsibility for the respondents. This, in conjunction with the answers to questions 1a and 1b, shows that the target population (senior managers with a responsibility for linking business strategy and strategic IS/IT applications) has been reached successfully. The functional strategies referred to in the last question (which secured 40 responses) are indicated in the categories shown in the following table:

Value label	Freq	%	Val%	Cum%
Manufacturing planning/operations strategy	8	20.0	20.0	20.0
Marketing, 'direct marketing' strategy	12	30.0	30.0	50.0
Logistics or supply management strategy	4	10.0	10.0	60.0
Human resource management strategy	4	10.0	10.0	70.0
Culture change/change management strategy	2	5.0	5.0	75.0
Financial management or financial strategy	8	20.0	20.0	95.0
Strategy for 'new technology development'	2	5.0	5.0	100.0
Not answered	0	0.0		
Total	40	100.0	100.0	

Valid cases 40 Missing cases 0

This provides little extra information, other than that the data for the participants' involvement in the category 'manufacturing planning and operations strategy' (20%) is higher than might be expected considering the relatively low percentage of manufacturing companies in the target population. Also, the return for the 'financial management and financial strategy' category (20%) is somewhat lower than might be expected, considering

that the finance function or financial management is probably universal to all the participating companies.

6.6.2 The Role of IS and IT in the Participant Companies

This information is needed to assess the participant companies' approach to IS/IT in terms of the planning, development and operation of the IS/IT functions:

2a. Organisation's IS/IT Practices

This item is intended to ascertain the importance of the activities related to the IS/IT planning, development functions and operations which are in place formally in the participating organisations. The respondents were asked to indicate the situation that was the most important IS/IT planning feature in their organisation. This factor was given the variable name COMPORG and the SPSS® analysis produced the following table.

Value label	Freq	%	Val%	Cum%
Planning IT infrastructure ('an IT strategy')	6	9.2	9.3	9.3
Managing IS 'applications portfolio'	7	10.5	10.8	20.1
Identifying business opportunities for IS/IT	14	21.2	21.5	41.6
Strategic IS planning (i.e. 'an IS strategy')	16	24.2	24.6	66.2
Linking business strategy and IS/IT strategies	18	27.3	27.6	93.8
Selecting projects matching IS/IT strategy	3	4.6	4.6	98.4
Auditing IS/IT system performance	1	1.5	1.6	100.0
Not answered	1	1.5		
	----	-----	-----	
Total	66	100.0	100.0	

Valid cases 65 Missing cases 1

The item that occurs most frequently as a response is 'linking business and IS/IT strategies' (27.6%) while the next most common activity (at 24.6%) is 'forming an IS strategy or strategic information systems plan'. This finding is reinforced by an associated 'IS applications portfolio management' item (10.8%) while the corresponding item in the IT domain ('planning IT infrastructure') occurs much less frequently at 9.3%. This compares interestingly with the findings in relation to Question 1c, where only a slight majority of respondents (6.1%) were responsible for setting or managing their company's IS strategy as opposed to the IT strategy. The two items with the lowest rate of return were a method for auditing existing IS/IT systems (1.6%) and a method for selecting IS/IT projects which match or serve the objectives of the corresponding strategy (4.6%). The implications of the former are that two important elements of the overall strategic process are lacking in the majority of participant companies. First, a failure to monitor the

performance of existing IS/IT applications can lead to the appearance of legacy systems (Slee and Slovin 1997) and indicates a significant lack of a vital input to the IS applications portfolio management and IS strategy processes (Hatten and Hatten 1997). Second, an IS/IT project planning process which does not seek to select candidate projects which are strategic (presumably by focusing on operational or short-term factors as selection criteria) possibly cannot serve the needs the IS or IT strategies to which they should be linked. The findings in this section may be reinforced by examining the role of IS and IT, and this is reported in the next section.

2b. Role of IS/IT in Organisation

This item contains a series of statements that are intended to establish the predominant role of IS/IT in the participant organisations. These are represented by the respondents' indication that one of the statements included in the test most closely describes the current situation with regards to the position of and attitudes to IS/IT in general in the respondent's organisation. This was given the variable name ISITROLE and the SPSS® analysis produced the following table.

Value label	Freq	%	Val%	Cum%
IS/IT is an integral part of business strategy	4	6.2	6.4	6.4
IS/IT is crucial to <u>current</u> business operations	40	60.2	62.4	68.8
IS/IT is an administrative support to business	18	27.4	28.0	96.8
IS/IT <u>currently</u> not important to the business	2	3.1	3.2	100.0
Not answered	2	3.1		
	----	-----	-----	
Total	66	100.0	100.0	

Valid cases 64 Missing cases 2

The results demonstrate clearly that IS/IT is of strategic importance to the sample population, as 68.8% of respondents indicate that IS/IT is either an integral part of the business strategy or is crucial to their business operations. The proportion of respondents indicating that IS/IT is limited to an administrative support role (or is only likely to achieve a critical degree of importance in the future) is significant at 28.0%, and a very small minority (3.2%) felt that IS/IT had no importance to their organisations. This confirms a major precept of the research, IS/IT applications are of strategic importance to a significant number of successful UK companies.

2c. Management View of IS/IT

This item seeks to establish the way in which the top management of the participant organisations views their own IS/IT functions, as rated by the respondents' degree of

agreement with the following statements. The variable name TOPMAN was used and the SPSS® analysis produced the table that follows. The respondents were asked to indicate a rating (on a scale of 1-4) of the statement which applies most closely to the attitude of top management in their company. The response to this issue is unequivocal. A large majority of respondents (93.8%) felt ‘much’ and ‘some’ agreement with the statement that the strategic potential of IS/IT is well recognised in their organisation.

Significantly, more than half of the respondents (52.3%) felt a high degree of agreement with this statement. Also, a large majority of respondents (86.2%) felt ‘some’ or ‘much’ agreement with the statement that IS/IT issues were important to the non-IS/IT functions in the organisation, and were felt to be topics of frequent discussion in those business areas.

Value label	Much	Some	Little	None	Row total
The strategic potential of IT is well-recognised as a competitive force	34 52.3%	27 41.5%	2 3.1%	2 3.1%	65
IS/IT management has at least equal importance to other business areas	17 26.2%	38 58.4%	10 15.4%	0 0	65
IS/IT issues are felt to be crucially important by other business areas	31 47.8%	25 38.4%	6 9.2%	3 4.6%	65
Every effort is made to involve IS/IT managers in top-level decisions	17 26.1%	34 52.4%	10 15.3%	4 6.2%	65
IS/IT strategy are linked successfully to business and functional strategies	2 3.0%	21 32.3%	17 26.2%	25 38.5%	65
IS/IT management is a completely separate issue from other areas	8 12.3%	13 20.0%	23 35.4%	21 32.3%	65
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Column total	109	158	68	55	390
Number of missing observations	1				

Smaller proportions (81.5% and 78.5% respectively) of respondents felt ‘some’ or ‘much’ agreement with the statements that IS/IT management is at least as important to the organisation as the management of other business functions. They felt that enough effort was made to involve IS/IT managers in top-level decisions and strategy setting. A smaller proportion of the respondents (32.3%) indicated an above-average agreement that the management of the IS/IT functions is a separate issue from the management of other functional areas.

Only 35.3% of respondents felt ‘some’ or ‘much’ agreement with the statement that the IS/IT strategy in the organisation is linked successfully to the business strategy, while 38.5% felt no agreement with the statement. This means that there is a gap in the respondents’ perception of the importance of this linkage (which is high) and their involvement in it (which is also high) and their perception of their organisations’ low success in achieving such a linkage.

6.6.3 Strategic and Market Factors

This section is included in the instrument to analyse the business environment and the market characteristics of the participating organisations, their attitudes to these factors and the strategies adopted when using IS/IT in response to competitive pressures:

3a. The Organisations' Market Sectors

The predominant characteristics of the organisations' market or business sector(s) are shown by the responses to this question. The respondents were asked to indicate the factor which applied most accurately or specifically to the relationship between their organisation and its market sector. The item was given the variable name MARBUS and the SPSS® analysis produced the following table.

Value label	Freq	%	Val%	Cum%
There is intense competition in the market	12	18.8	18.8	18.8
IS/IT is often used for strategic collaboration	3	4.4	4.4	23.3
A history of new firms entering the market	2	3.0	3.0	26.2
New entrants often use IS/IT to gain entry	7	10.5	10.5	36.7
New products/ services use innovative IT	8	12.1	12.1	48.8
A buyer's market - customers have influence	8	12.1	12.1	60.9
Suppliers have considerable bargaining power	2	3.0	3.0	63.9
IT is main way of delivering goods/services	5	7.4	7.4	71.3
Business strategies depend on IT	9	13.6	13.6	84.9
IT can create new strategic opportunities	9	13.6	13.6	98.5
IT has <u>no impact</u> on suppliers/customers etc.	1	1.5	1.5	100.0
Not answered	0	0.0		
	----	-----	-----	
Total	66	100.0	100.0	
Valid cases	66	Missing cases	0	

The picture that the survey gives of the environment in which the participating firms operate is noticeably divided. Six of the factors score between 10% and 20%, while five score less than 8%. This indicates that intense competition (18.8%), the use of IS/IT in demolishing barriers to entry (10.5%), the use of IS/IT in product/service innovation and operation in a buyers market (both 12.1%) can be regarded as important 'market factors'. In only 1.5% of cases did IS/IT have no impact on the organisations' customers, suppliers or associates. Similarly the potential of IS/IT for creating new strategic opportunities and the dependency of business strategy on IS/IT (both 13.6%) are important strategic factors. Conversely, other factors that are perplexingly negative, for instance the returns indicate

that IS/IT is not often used to enable strategic collaboration. Also, suppliers did not appear to have much bargaining power (3.0%) and IT is rarely the main way of delivering products or services (7.4%). The implication is that the respondents see their organisations operating in a competitive marketplace, but the negative indicators suggest scope for future development in the strategic use of IS/IT.

3b. The Organisation's Main Strategies

The main strategies that are employed by the participant firms to operate in their respective markets and business environments may be classified by the main objectives that they pursue. The variable name MAINST was used and the SPSS® analysis produced the following data.

Value label	Freq	%	Val%	Cum%
Cost leadership - offering cheaper products	6	9.1	9.1	9.1
Differentiation of products/services from rivals	34	51.5	51.5	60.6
Aiming new products/services at niches	6	9.1	9.1	69.7
Growth by self-generated expansion	12	18.2	18.2	87.9
Growth through partnerships and alliances	8	12.1	12.1	100.0
Not answered	0	0.0		
	----	----	----	
Total	66	100.0	100.0	
Valid cases	66	Missing cases	0	

The strategy of differentiating a firm's products and/or services is clearly the most common among the participants in this survey with 51.5% of the responses. This tends to confirm theoretical work on marketing strategies (e.g. Porter 1980) which proposes differentiation as the most viable strategy for a typical firm in an average market. The same work suggests that cost leadership is a strategy which most successful firms will tend to avoid under normal circumstances and the findings seem to confirm this, as a minority of respondents (9.1%) indicated this as their firm's main strategy. Clearly, growth is an important factor in selecting a dominant strategy among the participating firms. Almost a third of them (30.3%) indicated a growth-led strategy as being most important, with internal expansion being predominant and growth by alliance being secondary (which confirms one of the findings in response to Question 3a. This is somewhat surprising, as the literature would tend to suggest that the formation of virtual corporations using IT and electronic trading alliances (e.g. electronic data interchange networks) are a major factor in the business domain at the moment. IS/IT also has obvious applications in support of product/service innovation, a category that is noticeably under-represented at 9.1%.

3c. The Organisation's Main Strategic Components

The importance of the strategic components (as described in the research hypotheses) of the participant companies' strategies are ranked below, in terms of their importance to the firms' business strategies. The variable was given the name STRATT and the SPSS® analysis produced the table that follows. A rating of '4' indicates the highest subjective level of importance, with '1' as the lowest level. The strategic attribute which is given the highest ranking by the majority of respondents is 'competitive positioning' which is rated 'above average' (i.e. '3' or '4') by 84.8% of the respondents and was also the lowest-rated attribute among a small minority of respondents (6.1%). Clearly, competitive positioning in the firm's market environment (as would be defined by Porter's ICA framework) can be called a common or popular strategic attribute among the participating companies. The attribute with the next highest rating is 'strategic flexibility' that was rated 'above average' by 72.7% of respondents and was given the lowest rating by 6.1%.

Value label	1 Low	2 <===	3 ===>	4 High	Row total
Competitive positioning	4 6.1%	6 9.1%	16 24.2%	40 60.6%	66
Strategic flexibility	4 6.1%	14 21.2%	18 27.2%	30 45.5%	66
Strategic alignment/cohesion	10 15.2%	14 21.2%	18 27.2%	24 36.4%	66
Strategic vision	8 12.1%	12 18.3%	18 27.2%	28 42.4%	66
Value chain integration	24 36.4%	19 28.8%	16 24.2%	7 10.6%	66
	-----	-----	-----	-----	-----
Column total	50	65	86	129	330

No. of missing observations 0

These two strategic attributes were clearly of considerable importance to the respondents, while the other strategic attributes were consistently less highly rated and also had a more even profile across the different grades from 'low' to 'high'. The attribute 'strategic vision' was rated 'above average' by 69.6% and 'low' by 12.1% of respondents, and 'strategic alignment or cohesion' was rated 'above average' by 63.6% and 'low' by 15.2%. These ratings may be lower, but they are still felt to be significant in terms of the influence they have on the strategies that the participant companies are developing. The remaining postulated strategic component 'value chain integration' was much less in evidence among the respondents as only 34.8% rated it 'above average' and more than this (36.4%) rated it as 'low'. These findings prove the hypothesis that the strategic attributes of strategic positioning, strategic vision, strategic flexibility and strategic alignment are of strategic importance to successful UK companies. In the case of value chain integration the opposite hypothesis (i.e. that it was not important) was also proven.

The proposed linking framework will therefore be based on the first four of these strategic attributes.

6.6.4 Strategic Application of IS/IT

This section is intended to establish the respondents' definition of a strategic IS and/or a strategic application of IT. Also, it is intended to record and analyse the participant organisations' approach to planning, developing and operating IS and IT applications which are of strategic importance to them, and to examine their experience of such strategic applications. This is important, as one of the research questions (see Chapter 5) is to establish how common strategic IS/IT applications are in successful UK companies. The details are as follows:

4a. Strategic IS/IT System Development

The proportion of the target population that has developed a strategic IS (SIS) or an IS/IT application which they consider to be of strategic importance to their business is as follows:

	Freq.	%
Have developed such a system	55	83.3
Have <u>not</u> developed such a system	11	16.7
Total	66	100.0

The reasons why the participating organisations that have not developed or are not operating a SIS (or an application of IT that they would consider to be strategic) are indicated by the response data in this part of the questionnaire. Only organisations that have not produced such systems were requested to complete this question. Although this negative information does not contribute directly to the production of the research framework it provides useful information about the state of IS/IT planning in successful UK companies. The variable name STRATAPP was used, and the SPSS® analysis produced the data that follows. This is a relatively small sample and it is not claimed to have complete internal validity, but the results are worthy of some comment. The distribution of reasons for non-development of a strategic application is very unequal. Five of the nine reasons that are included in the section secured no responses. The univariate analysis shows that 54.6% of the organisations which had not developed a strategic IS/IT application were either planning to develop such an application already or had not yet identified an opportunity to do so. A significant number of participating organisations have not identified a business opportunity to develop a strategic system (27.3%). An identical number of organisations state that they are planning to develop such an application, implying that an opportunity has been identified to a greater or lesser

extent but that development of the system has not yet begun. The most frequent reason for not developing a strategic application is that the organisation lacks the necessary staff skills or experience of suitable development methods (36.4%).

Value label	Freq	%	Val%	Cum%
Does not consider application appropriate	1	9.0	9.0	9.0
Is planning to develop such an application	3	27.3	27.3	26.3
Has not yet identified an opportunity	3	27.3	27.3	53.6
Lacks the necessary staffs skills/experience	4	36.4	36.4	100.0
Lacks access to the necessary technology	0	0.0	0.0	
Regards development as 'too risky'	0	0.0	0.0	
Development regarded as 'too costly'	0	0.0	0.0	
Thinks it will not achieve expected benefits	0	0.0	0.0	
Feels that advantages may be temporary	0	0.0	0.0	
Not answered	0	0.0		
	----	-----	-----	
Total	11	100.0	100.0	

Valid cases 11 Missing cases 0

Significantly, none of the participants felt that access to appropriate technology was a deterrent to development and the cost and risk factors were equally unimportant. The negative responses to the final two questions would appear to indicate that scepticism about the benefits or advantages offered by such systems are not significant. This analysis implies that there is some enthusiasm for strategic IS/IT applications among the organisations that do not have them, but that a lack of skill or access to methods is a considerable deterrent to their development. The next task is to find out why the systems are considered to be strategic in nature.

4b. Reason for Considering the IS/IT Application to be Strategic

This question is intended to find the reasons why participant organisations consider the IS/IT applications that they have developed as strategic and is only answered by respondents from organisations that have developed such IS/IT applications. It is intended to produce a definition of the term strategic through the empirical experience of the respondents, by assessing their degree of agreement with the following propositions. The variable name STREASON was used and the SPSS® analysis produced the table that follows. The two most common reasons for defining the system as strategic are the degree of impact on the organisation's business operations (100% expressed 'much or 'some' agreement) and the fact that it is at the core of its business operations (95.84% expressed 'much or 'some' agreement). Interestingly no respondent expressed 'little or no'

agreement with the former point or no agreement with the latter. This established them clearly as predominant definitions of a strategic IS/IT application. The next two items show consensus, but with a lower level of agreement. Predictably, the linkage with the organisation's business strategy (83.34% expressed 'much or some' agreement) and the transformation of the organisation's business operations (70.8% expressed 'much or some' agreement). The remaining definitions show a lower degree of consensus.

Value label	Much	Some	Little	None	Row total
The organisation could not exist without the strategic application	23 41.8%	17 30.9%	12 21.8%	3 5.5%	55
It is at the core of the firm's primary business activities	44 80.0%	9 16.4%	2 3.6%	0 0.0%	55
It has a high impact on the firm's business operations	46 83.6%	9 16.4%	0 0.0%	0 0.0%	55
It allows a business collaboration or relationship to take place	12 21.8%	16 29.1%	21 38.2%	6 10.9%	55
It is an innovative way of delivering a product or service	14 25.5%	12 21.8%	23 41.8%	6 10.9%	55
It is necessary to compete with the organisation's competitors	23 41.8%	24 43.7%	8 14.5%	0 0.0%	55
It supports the organisation's strategic management processes	18 32.7%	13 23.6%	11 20.0%	13 23.6%	55
It is linked closely to the firm's business/corporate strategy	35 63.7%	12 21.8%	8 14.5%	0 0.0%	55
It has transformed the firm's business functions/processes	26 47.3%	13 23.6%	14 25.5%	2 3.6%	55
	-----	-----	-----	-----	-----
Column total	241	125	99	30	495

No. of missing observations 0

Surprisingly, in the light the responses to other questions, competition with the organisation's rivals was placed fifth out of eight available definitions (83.82% expressed 'some' or 'much' agreement with only 41.66% expressing 'some' agreement). Also, 'support for the organisation's processes of strategic management' was surprisingly rated in sixth place (58.33% expressed 'some' or 'much' agreement) as this is regularly cited as a definition of a strategic system in the literature. Two definitions which fit particularly well into Porter's ICA framework (IT 'as a means of delivering a product or service' and IT 'allowing business collaboration...') show the lowest levels of consensus and the lowest ratings of agreement.

4c. Description of Strategic IS/IT Application

This question is intended to categorise the system that the organisation regards as a strategic IS/IT application and which is described in Question 4a. This question is obviously important in establishing which types of strategic system are being developed by successful UK companies. The variable name STRATYPE was used and the SPSS®

analysis produced table that follows. An analysis of the data indicates that the majority of strategic IS/IT applications (30.9%) which the successful organisations have developed are actually data- or transaction-processing systems that are considered to be strategic because they are at the core of the business and are therefore of central importance to it.

Value label	Freq	%	Val%	Cum%
EDI or paperless trading system	9	16.3	16.3	16.3
Inventory/availability ordering/supply system	9	16.3	16.3	32.6
IOS sharing processes with partners/allies	2	3.6	3.6	36.2
IOS exchanging expertise with partners	1	1.8	1.8	38.0
DP/TP system at the core of the business	17	30.9	30.9	68.9
EIS which aids strategic management	6	11.0	11.0	79.9
System which transforms business processes	10	18.3	18.3	98.2
Knowledge-based business system	1	1.8	1.8	100.0
Not answered	0	0.0		
	----	-----	-----	
Total	55	100	100	
Valid cases	55	Missing cases	0	

The second most frequently cited item (18.3%) is the category of IS/IT application that is intended to transform the company's organisational structure and/or business processes. This result is somewhat unexpected, as most of the instances cited in the literature search appeared to describe systems in the categories that tied for third place (16.3%). This includes EDI or paperless trading systems and inventory systems aiding in the ordering and supply of physical goods or services (e.g. JIT systems and service/agency booking systems). It is perhaps surprising that another of the categories of system which is described frequently in the literature (i.e. an inter-organisational IS shared with partners or allies) is the second least frequently cited item. The least frequently cited category is the expert system or artificial intelligence application. It is now possible to link the details of the application to the strategic component by finding out which components the application is intended to support.

4d. Support for the Strategic Components

This question seeks to link the organisation's intentions in developing strategic IS/IT application to the business strategy that the organisation has chosen to operate. In seeking to gain this information it is assumed that the components of the linkage between business strategy and the development of strategic IS/IT applications are those identified in the literature search in Chapter 4. The variable name SUPPORT was used and the SPSS® analysis produced the table that follows. Four of the categories are cited frequently in this



analysis, with value chain integration being the exception at a rating of 9.1%. The intended use of the system to support the organisation's strategic position is clearly the most frequently cited item (25.9%) and indicates the strategic importance of IS/IT in the competitive market-place.

Value label	Freq	%	Val%	Cum%
Strategic position/competitive manoeuvring	14	25.4	25.9	25.9
Strategic vision, developing future scenarios	9	16.4	16.7	42.6
Strategic flexibility coping with change	11	20.0	20.4	63.0
Strategic alignment or cohesion of strategies	15	27.3	27.7	90.7
Value-chain integration linking business allies	5	9.1	9.3	100.0
Not answered	1	1.8		
	----	-----	-----	
Total	55	100.0	100.0	

Valid cases 54 Missing cases 1

The second most frequently cited intention at 27.7% is 'strategic alignment', indicating the importance of the perceived need to link the business and IS/IT strategies. 'Strategic flexibility' is the next most highly rated at 20.4%, indicating that the ability to change strategic direction and to cope with environmental change is needed in strategic IS/IT applications. The remaining strategic attribute, 'strategic vision' is moderately well represented with a rating of 16.7%. Taken in conjunction with the response to Question 3c this adds to the support for the research hypotheses.

4e. Success of the Supported Strategy

This question seeks to assess the extent to which the strategic IS/IT application described in Question 4c is successful in supporting the components of business strategy as identified in the literature search in Chapter 4. The variable name SUPPORT was used and the SPSS® analysis produced the following table. The analysis shows that the systems that were intended to achieve strategic flexibility had 40.1% of the respondents claiming an 'above average' perceived degree of success and 30.9% claiming 'low' success. The systems that are intended to support 'strategic positioning' strategies were found to have produced a 33.4% 'above average' rating with 35.0% of respondents declaring a 'low' score. This is significant in view of the responses to Questions 3c and 4d that show the importance of competitive positioning in the respondent organisations' strategies. The degree of success of the systems intended to support strategic vision was slightly lower, with 36.4% of the systems claiming 'above average' and 30.9% claiming 'low' success.

The systems supporting the strategic attributes of ‘strategic alignment’ and ‘value chain integration’ featured less successfully, with 21.9% of respondents rating both as having an ‘above average’ degree of success. Systems in the ‘strategic alignment’ category were in general more successful with a ‘low’ rating of 30.9% to the 45.4% ‘low’ rating of the ‘value chain’ category. The responses to this question indicate that the strategic systems could be much more successful at supporting their strategies.

Value label	1	2	3	4	Row total
	Low	<===	===>	High	
Strategic positioning, competitive manoeuvring in the marketplace	14	23	16	2	55
	25.0%	41.6%	29.0%	4.4%	
Strategic vision, developing future business scenarios	17	18	12	8	55
	30.9%	32.7%	21.8%	14.6%	
Strategic flexibility, coping with environmental/strategic change	17	16	12	10	55
	30.9%	29.0%	21.8%	18.3%	
Strategic alignment or the linking of business/functional strategies	17	26	7	5	55
	30.9%	47.2%	12.7%	9.2%	
Value-chain integration linking business partners and allies	25	18	7	5	55
	45.4%	32.7%	12.7%	9.2%	
	-----	-----	-----	-----	-----
Column total	90	101	54	30	275
No. of missing observations	0				

6.6.5 Development of the Strategic System

This section of the research instrument is intended to assess the respondents’ experience of developing the strategic IS/IT application recorded in Section 4 and to record details of the factors which affected the development of the system. The first question is intended to ascertain the source of the original idea to use IS/IT strategically in the organisation. This is important in determining the need to link the business strategy and IS/IT development:

5a. Source of the Strategic Idea

This question is to record the source of the initial idea behind the development of the strategic IS/IT application noted in Question 4c. This is important as it relates to two of the identified strategic components: the vision behind the strategy and a manoeuvre towards a strategic position. The variable name SOURCE was used and the SPSS® analysis produced the table that follows. Clearly, the sources of inspiration for strategic applications are near the top of the organisations. The process could be described as top down as 20 % of the initiation activity came from the senior level of management. The process may also be a group activity, as some 37% of the ideas came from the board of directors or the IS/IT steering committee. Bearing in mind that strategic applications of IS/IT are developed to exploit business opportunities, a high proportion of the ideas behind the systems (23.6%) came from IS/IT directors. There is a clear distinction here between the creativity of the IS/IT directors and the less senior technical staff, who did not initiate any of the ideas.

Value label	Freq	%	Val%	Cum%
Chief executive officer	11	20.0	20.4	20.4
Board of directors/executives	17	30.9	31.4	51.8
IS/IT director	13	23.6	23.9	75.7
IS/IT manager (i.e. lower than director)	0	0.0	0.0	75.7
IS/IT steering committee/user group(s)	4	7.3	7.4	83.1
Chief operations officer	3	5.5	5.6	88.7
Finance director	3	5.5	5.6	94.3
Managers of strategic business unit	1	1.8	1.9	96.2
Operations director	1	1.8	1.9	98.1
Senior line manager(s)	1	1.8	1.9	100.0
Not answered	1	1.8		
	----	-----	-----	
Total	55	100.0	100.0	

Valid cases 54 Missing cases 1

5b. Background to the Strategic Application

This question seeks to establish the background to the development of the strategic IS/IT application described in Question 4c. The respondents were asked to indicate which statement best describes the background to the development of the strategic application. The variable name SYSBACK was used to define the data and the SPSS® analysis produced the following table:

Value label	Freq	%	Val%	Cum%
Part of 'long-term' strategy for <u>all</u> applications	11	20.0	21.5	21.5
Part of a review of <u>strategic</u> applications	4	7.3	7.8	29.3
Managing the <u>overall</u> IS applications portfolio	13	23.6	25.5	54.8
A business opportunity identified in isolation	5	9.1	9.8	64.6
Following the advice of external consultants	7	12.7	13.8	78.4
Falling into line with parent firm's standards	1	1.8	1.9	80.3
Pressure from users in business areas	7	12.7	13.8	94.1
Request from partners (e.g. customers)	3	5.5	5.9	100.0
Not answered	4	7.3		
	----	-----	-----	
Total	55	100.0	100.0	

Valid cases 51 Missing cases 4

A large majority of respondents (47%) placed the strategic system development in the context of a general strategy or the management of the general IS applications portfolio, indicating that the strategic applications tended not to be developed as a part of a specific strategic process. In addition the application was developed as a part of a strategic review in only 7.8% of valid cases, and only 9.8% of the systems were developed through identifying a business opportunity. Clearly, the responding organisations do not use system development methods that are intended for strategic applications. This finding is of vital importance to the research as it indicates that there is scope for the development of a method which is intended specifically for developing strategic systems and is therefore likely to be more effective under these circumstances. The same data also indicates that the organisations were reactive rather than proactive in developing their systems, as 21.6% of them were responding to pressure from parent organisations or requests from business partners or allies.

5c. Reason for the Development of the Strategic Applications

This question is intended to ascertain the primary reasons behind the initial development of the strategic IS/IT application referred to in Question 4c. The variable name SYSREAS was used and the SPSS® analysis produced the following table:

Value label	Freq	%	Val%	Cum%
Achieve a 'first mover' advantage	9	16.4	16.7	16.7
Exploit/sustain existing market advantage	12	21.8	22.1	38.8
Improve supply or service to customers	17	30.9	31.3	70.1
Improve suppliers' value, quality or service	3	5.5	5.6	75.7
Enter a new market sector	0	0.0	0.0	75.7
Prevent potential rivals entering the market	1	1.8	1.9	77.6
Alternative to an existing product or service	2	3.6	3.7	81.3
Innovative product/service in market	5	9.2	9.3	90.6
Gain future experience of strategic IS/IT	2	3.6	3.7	94.3
Improve business process understanding	1	1.8	1.9	96.2
Support a strategic process (e.g. marketing)	1	1.8	1.9	98.1
Support the strategic management process	1	1.8	1.9	100.0
Not answered	1	1.8		
	----	-----	-----	
Total	55	100.0	100.0	
Valid cases	54	Missing cases	1	

The definition of the reason for developing a strategic IS/IT application may be regarded as the first important stage in the strategic system development process. It is therefore felt to be important to categorise the reasons for developing the strategic IS/IT application. This is useful when examined in conjunction with the responses to the questions on strategy in Section 4. It is perhaps predictable that the most common reasons are related to customer service level (31.3%) and competitive advantage in the organisation's market sector (22.1%). Taken in conjunction with the findings in response to Question 4d this confirms that a competitive strategic position is a major organisational objective which IS/IT applications are developed to support. The importance of 'first mover advantage' (16.7%) may indicate that 'responsiveness' or strategic flexibility are also important as indicated in response to Question 4d. Some other factors that would fit into a competitive strategic framework (e.g. erecting or demolishing barriers to market entry) are noticeably less important. It is also of interest that very few (1.9%) of the strategic applications were developed to support the processes of strategic management (e.g. EIS or strategic DSS).

All of this information is general, and in order to explore the possibility of developing a valid strategic framework it is necessary to ascertain the organisations' specific experiences and practices with regard to developing strategic IS/IT applications. The following questions are therefore intended to explore the range of tasks or activities that are used by the successful UK companies to support the development of their strategic IS/IT applications.

5d. Development of the Business Strategy

This question refers to the initial activity of developing the business strategy or identifying the business opportunities that the strategic IS/IT application was developed to achieve or maintain and to find out whether the tools and techniques identified as being relevant in the literature search were used in practice. The following table shows that 70.8% of the system development cases included some activity related to the creation or development of a business strategy:

	Freq	%
Cases in which this activity was present in the development	39	70.8
Cases in which activity was <u>not</u> present in the development	16	29.1
Total	55	100.0

This means that the cases in which this activity was present represent a valid data set, so the variable name STAGE1 was used and the SPSS® analysis produced the data that follows. IT should be remembered that the respondents' experience in the area of setting

business strategy is less than with the other aspects of the development of strategic systems (see the responses to Questions 1c and 1d). It is interesting that 41.0% of the companies developing the major strategic IS/IT application had not used a formal method to support the process, while a significant proportion of the remainder (25.6%) used a formal but in-house method. The technique that occurs most frequently is Porter's ICA model. This reinforces the findings in response to Questions 4d and 5c.

Value label	Freq	%	Val%	Cum%
Michael Porter's 5 forces (ICA) model	6	15.4	15.4	15.4
Michael Porter's value chain analysis model	3	7.7	7.7	23.1
C. Wiseman's strategic options generator	2	5.1	5.1	28.2
Philip Kotler's market segmentation model	1	2.6	2.6	30.8
Kepner-Tregoe method	1	2.6	2.6	33.4
A 'formal' but 'in-house' method	10	25.6	25.6	59.0
No formal method was used	16	41.0	41.0	100.0
Not answered	0	0.0		
	----	-----	-----	
Total	39	100.0	100.0	
Valid cases	39	Missing cases	0	

5e. Identifying High Impact IS/IT Applications

This question seeks to identify the methods that the successful organisations used to support the activity of identifying IS/IT applications in the existing applications portfolio. This could have a high impact on the organisation's structure and business processes and to find out whether certain tools were used in practice for this purpose. The following table shows that 87.3% of the cases included the identification of high impact opportunities as an activity:

	Freq	%
Cases in which this activity was present in the development	48	87.3
Cases in which activity was <u>not</u> present in the development	7	12.7
Total	55	100.0

The cases in which this activity was present represent a valid data set, so the variable name STAGE2 was used to analyse the data in more detail, and the SPSS® analysis produced the data that follows. As with the response to Question 5e, a large majority of the organisations that had included this stage in the development of their strategic IS/IT application had not used a formal method to identify the strategic applications and a relatively high proportion (20.8%) used an in-house method. Also, only one of the proprietary techniques (the strategic grid) occurs with any significance, at 14.6%. This

finding is interesting. In view of the number of techniques which were identified in the literature search and which are available for supporting this stage. This lack of formality is a noticeable feature of the linkage between the business strategy and IS/IT developments. There is, in particular, a noticeable difference between the use of techniques in identifying the business impact of the systems development and measuring the financial benefits, where a confusing number of techniques are in common use (e.g. Farbey *et al.* 1995b)

Value label	Freq	%	Val%	Cum%
McFarlan and McKenney's strategic grid	7	14.6	14.6	14.9
G. Parson's strategic IT mapping technique	1	2.1	2.1	17.1
Philip Kotler's market segmentation model	1	2.1	2.1	19.3
A 'formal' but 'in-house' method	10	20.8	20.8	40.5
No formal method was used	29	60.4	60.4	100.0
Not answered	0	0.0	0.0	
	----	-----	-----	
Total	48	100.0	100.0	

Valid cases 48 Missing cases 0

5f. Identifying the Strategic Potential of IS/IT

This question seeks to identify and classify the methods that the organisations had used to support the activity of exploring the potential for using IS/IT in support of strategic moves and to find out whether certain tools which were identified in the literature search were used in practice. The following table shows that 70.9% of the system development cases sought to identify the strategic potential of IS/IT in order to apply the system development to particular strategic objectives or to support particular strategic components:

	Freq	%
Cases in which this activity was present in the development	39	70.9
Cases in which activity was <u>not</u> present in the development	16	29.1
Total	55	100.0

The cases in which this activity was present represent a valid data set, so the variable name STAGE3 was used to analyse the data in more detail, and the SPSS® analysis produced the data that follows. The responses to this question continue the emerging trend of informality and lack of proprietary technical support. In this case, almost half of the organisations (48.9%) did not use a formal method and 36.1% used an in-house method. Michael Earl's strategic framework was used to explore the strategic potential of the IS/IT application in only 2.0% of the cases and several other proprietary methods occur only singly. As with the stage of identifying the business impact of strategic IS/IT

developments there is a noticeable difference between the use of formal techniques for identifying the strategic potential of IS/IT and the measurement of business benefits.

Value label	Freq	%	Val%	Cum%
Michael Earl's strategic frameworks model	2	5.0	5.0	5.0
Ives/Learmonth customer resource lifecycle	1	2.5	2.5	7.5
C. Wiseman's strategic options generator	1	2.5	2.5	10.0
IBM's business systems planning method	1	2.5	2.5	12.5
JMA's business area analysis	1	2.5	2.5	15.0
A 'formal' but 'in-house' method	14	36.1	36.1	51.1
No formal method was used	19	48.9	48.9	100.0
Not answered	0	0.0		
	----	-----	-----	
Total	39	100.0	100.0	
Valid cases	39	Missing cases	0	

5g. Linking the Business and IS/IT Strategies

This question seeks to identify the factors that linked the business strategy with the IS and/or IT strategies in the organisations, and to find out whether certain tools which were identified in the literature search were used in practice for aligning the business/functional strategies and the technical (i.e. IS/IT) strategies. The stage of strategic cohesion or alignment of the business and IS/IT strategies represents a particularly important part of the development of the strategic IS/IT application and may be central to the whole process of strategic development. The literature search has identified a large amount of material on the subject of strategic alignment, much of which stresses the importance of the process and surveys which show consistently that IS/IT practitioners rate strategic alignment as one of their most important concerns. The following table shows that 81.8% of the cases included the identification of the strategic potential of IS/IT as an activity:

	Freq	%
Cases in which this activity was present in the development	45	81.8
Cases in which activity was <u>not</u> present in the development	10	18.2
Total	55	100.0

The cases in which this activity was present represent a valid data set, so the variable name STAGE4 was used to analyse the data in more detail, and the SPSS® analysis produced the data that follows. Here again the responses continue to confirm that formal methods are not used in support of the development of strategic IS/IT applications, as

indicated by the high (58.2%) response rate to this question. Correspondingly, the percentage of respondents (17.6%) who claim that a 'formal but in-house' method was used is in support of this activity lower than is the case with the other activities.

Value label	Freq	%	Val%	Cum%
MIT'90s alignment model (SAM/SAP)	2	4.4	4.4	4.4
C. Wiseman's strategic options generator	3	6.6	6.6	11.0
IBM's business systems planning method	4	8.8	8.8	19.8
'Method for E and Y'	1	2.2	2.2	22.0
RONA performance tree	1	2.2	2.2	24.2
A 'formal' but 'in-house' method	8	17.6	17.6	41.8
No formal method was used	26	58.2	58.2	100.0
Not answered	0	0.0		
	----	-----	-----	
Total	4	100.0		

Valid cases 45 Missing cases 0

Interestingly, the distribution of the responses claiming to have used a proprietary method is much more equal, with the SAM/SAP model (4.4%), Wiseman's strategic options generator (6.6%) and IBM's BSP technique (8.8%) being the most common. This indicates that a significant proportion of the companies used a proprietary method for supporting this important stage.

5h. Linking the IS/IT Strategies to the Applications Portfolio

This question seeks to identify the factors linking the IS and/or IT strategies with the organisation's applications portfolio. The aim is to find out if certain tools which were identified in the literature search are used in practice when the organisations selected IS applications for development which meet the requirements of the IS /IT strategies. The following table shows that 74.5% of the system development cases included linking the IS/IT strategy to the process of managing the applications portfolio:

	Freq	%
Cases in which this activity was present in the development	41	74.5
Cases in which activity was <u>not</u> present in the development	14	25.5
Total	55	100.0

The cases in which this activity was present represents a valid data set, being 41 cases out of 55 (74.5%), so the variable name STAGE5 was given, and the analysis of the data using SPSS® produced the following data. The response to this question indicates that

formal methods are not used in support of this stage with an extremely high (58.2%) negative return. As with the previous question the number of organisations using a 'formal but in-house' method is correspondingly lower at 12.3%.

Value label	Freq	%	Val%	Cum%
John Burch's strategic IS planning method	2	4.9	4.9	4.9
James Martin's Information Engineering	4	9.8	9.8	14.7
'Method for E and Y'	1	2.5	2.5	17.2
Arthur Anderson's Method-1	2	4.9	4.9	22.1
A 'formal' but 'in-house' method	5	12.3	12.3	34.4
No formal method was used	27	65.6	65.6	100.0
Not answered	0	0.0		
	----	-----	-----	
Total	41	100.0	100.0	

Valid cases 41 Missing cases 0

Of the proprietary methods JMA's Information Engineering (or more likely a part of it) is the most frequently used at 9.8%. John Burch's strategic IS planning (SISP) method and Arthur Anderson's Method/1 are represented equally at 4.9%, a significant proportion in view of the other responses. It is important now to examine the achievement of strategic benefits.

5i. Identifying and Planning Strategic Benefits

This question seeks to identify the techniques that were used for identifying and planning the benefits to be achieved by the proposed strategic IS/IT application. The intention is to find out whether certain tools that are identified in the literature search were used in practice in support of the process of maximising the strategic benefits that accrue from the development of strategic applications. The following table shows that 87.3% of the cases included the activity of identifying and planning strategic benefits from the systems development:

	Freq	%
Cases in which this activity was present in the development	48	87.3
Cases in which activity was <u>not</u> present in the development	7	12.7
Total	55	100.0

The cases in which this activity was present represent a valid data set, so the variable name STAGE6 was used to analyse the data in more detail, and the SPSS® analysis produced the data in the table that follows.

Value label	Freq	%	Val%	Cum%
Information Economics or IBM's Sesame	6	12.5	12.5	12.5
The CSC/Index Foundation's Index Matrix	2	4.1	4.1	16.6
MIT 90's '5-level' transformation graph	2	4.1	4.1	20.7
Cost-benefit analysis (e.g. NPV/IRR)	6	12.5	12.5	33.2
Philip Kotler's market segmentation model	1	2.1	2.1	35.3
RONA performance tree	1	2.1	2.1	37.4
A 'formal' but 'in-house' method	16	33.4	33.4	70.8
No formal method was used	14	29.2	29.2	100.0
Not answered	0	0.0		
	----	-----	-----	
Total	48	100.0	100.0	
Valid cases	48	Missing cases	0	

This activity (which is suggested as being the final stage of the strategic systems development process) is represented by the greatest number of proprietary methods. It is perhaps surprising that 'cost-benefit analysis' appears as a supporting technique in as few as 12.5% of the cases, as the category is very common in the literature. It is possible that the use of some 'non-proprietary' cost-benefit techniques is included in the returns for the category of 'formal' but 'in-house' methods. Equally, modified or irregular versions of Information Economics and IBM's Sesame (indicated at 12.5% of occurrences) could be sufficiently similar to the more generic NPV/IRR techniques to make discrimination between them difficult. Correspondingly, the percentage of responses indicating that no formal method was used is lower than for the other stages at 29.2%, but the use of 'formal' but 'in-house' methods by the respondents is relatively high at 33.4%. In the category of proprietary methods the use of Philip Kotler's market segmentation model and the 'RONA performance tree' is declared by the same organisations which used them for several of the other stages (see the responses to Questions 5d, 5e and 5g). Their occurrence is less than that of the CSC/Index Foundation's index matrix and the '5-level transformation graph' which also have an equal standing at 4.1%.

6.7 Summary

Section 6.6.1 shows that the survey results are based on responses from a valid population of senior managers within successful UK companies who are responsible for and involved in the development of strategic IS/IT applications. Section 6.6.2 shows that identifying business opportunities for IS/IT, strategic IS planning and linking business strategy and IS/IT strategies are common activities in the participant organisations and that the role of IS/IT is both as a crucial part of their business operations and an administrative support.

It is also indicated that the strategic potential of IT is well recognised as a competitive force in the majority of the organisations. The importance of the management of the IS/IT function is not just felt to be equal to that of the other business areas but IS/IT issues in general are felt to be crucially important throughout the whole organisation. In the opinion of the respondents the participating organisations are cognisant of IS/IT matters and are aware of its strategic potential. Section 6.6.3 provides more detail, indicating that the respondents believe that their organisations operate in intensely competitive markets in which many of their business strategies depend on IS/IT and in which IS/IT can create advantageous strategic opportunities. Within this scenario, the strategies that are exercised have competitive positioning, strategic vision, strategic flexibility and strategic alignment as important attributes. This indicates a positive test of one of the most important hypotheses of the research.

Section 6.6.4 indicates that a majority of the firms within this population had developed strategic IS/IT applications, and that the commonest reason for not doing so is that they lacked the necessary staffs skills and experience. Indeed, many of the non developers would appear to fit into what Earl calls the delayed sector in terms of strategic IS/IT (Earl 1989) as they are planning to develop such an application or have not yet identified an opportunity to do so. The development method proposed by the research could be of considerable assistance to companies in this situation. The main reasons for the organisations considering their IS/IT application to be strategic are that it is at the core of the firm's primary business activities. It has a high impact on the firm's business operations (many respondents felt that their organisation could not exist without the strategic application) or is linked closely to its business strategy, and is necessary for the firm to compete in its market sector.

Interestingly, the majority of these systems would appear to be relatively unsophisticated, with DP systems at the core of the business being the most common sector and electronic data interchange and inventory ordering and supply systems also being commonly indicated. These systems were intended to support strategies of strategic position or competitive manoeuvring, strategic vision and developing future scenarios, strategic flexibility and coping with future change and strategic alignment or cohesion between separate strategies, which have been referred to earlier in relation to a major research hypothesis. The respondents rate the success of their organisations as only moderate in these areas, which is significant, as there appears to be a gap between the perceived importance of the indicated strategic attributes (in response to Question 3c) and the organisations' success in supporting them. Again, it is believed that the proposed method could be of great assistance to companies in closing this gap.

Section 6.6.5 deals with the organisations' experience of developing the strategic IS/IT application and is intended to ascertain the methods or techniques that were used. The picture that emerges is that the original idea to develop the strategic application came from the most senior level (i.e. chief executive officer or board of directors) in 51.8% of cases and that the idea came from the IS/IT director alone in 23.9% of cases. This shows that the development of strategic IS/IT applications is a business issue, and the proposed development framework must take this factor into account. The majority (47%) of these applications is initiated as a part of a long-term strategy or as a result of managing the overall IS/IT portfolio. The incidence of strategic systems being developed as a result of a specifically 'strategic' method is only 7.8%, implying that there is a considerable opportunity for the use of the proposed research framework. The most common reason for the development of the strategic application is to improve customer service (31.3%) with other competitive reasons (e.g. achieving a first mover advantage and exploiting or sustaining market advantage) being common at 38.8%. The other important findings from Section 6.6.5 are that there is evidence of a defined lifecycle linking the business strategy to the development of the strategic IS/IT applications in an average 78.7% of cases.

There is also a clear indication that in a majority of cases (50.6%) these important stages were carried out without the support of a formal method or technique and that an average of 24.3% of cases used a formal but in-house method. In only an average of 25.1% of cases was a formal and proprietary technique used. This survey indicates the potential for the use of the proposed development method and provides useful information for the selection of techniques to support the linking of business strategy and the development of strategic IS/IT applications. This should support the chosen strategic components, and the attributes of each component and some suitable techniques for supporting it are examined in the next four chapters. Before that, however, it is useful to recapitulate the stages in the research project, as described in detail in Chapter 2, as follows:

- **Stage 1 - Domain Investigation**

This stage includes a literature search in the three domains of the research as identified in Chapter 1, and includes an examination and definition of the properties of strategic systems. Stage 1 encompass a number of case studies of strategic IS/IT applications from the literature. The experience gained from these cases contributes to the research questions and hypotheses that are examined at the next stage;

- **Stage 2 - Hypothesis Formulation and Examination**

The hypotheses that evolve from the researcher's experience in Stage 1 are examined through a survey of industrial practice. The results of the survey are used to explore the hypotheses, in particular, hypothesis H2, which postulates that four components of

the strategic linking process are of significant importance to practitioners in the strategic IS/IT domain. Also, the results inform the development of the proposed strategic linking method;

- **Stage 3 - Analysis of Strategic Components**

The four components are analysed individually and in detail in Chapters 7, 8, 9 and 10 by using a further literature search. At this stage it is possible to identify some viable techniques to support the components and to assess the likely suitability of the techniques in practice using a variant of the feature analysis technique. The selected techniques are combined to form the basis of the proposed strategic linking method, which is the subject of the next stage of the research;

- **Stage 4 - Development of the Proposed Method**

The proposed method for improving the linkage between a business strategy and strategic systems development is formulated by using a literature search. However, before the proposed method can be 'generalised' for use in 'real world' applications, it must be validated. This is the subject of the next stage of the research, and is described in Chapter 11;

- **Stage 5 - Validation of the Proposed Method**

The validation stage is particularly important to the project, as without it, it will not be possible to have confidence in the major contribution of the research. It is not the intention to develop a fully practicable linking method, as the development, application and documentation of such a method would be beyond the scope of this research. A quasi-field study based on a sample of respondents to the original survey (see Stage 2) is used to draw conclusions about the likely value of the proposed strategic linking method in practice.

It is now possible to examine each of the chosen strategic components (i.e. strategic positioning, strategic vision, strategic flexibility and strategic alignment) in more detail, beginning with strategic positioning in the next chapter.

Chapter 7

Strategic Positioning

This part of the research deals with strategic positioning as a key component of the strategic linking process. This component is identified in the literature search as being common to many schools of strategy and approaches to strategy development. The purpose of this chapter is to explore the concept of strategic positioning and to examine methods that are suitable for defining an organisation's strategic position and sustaining that position in a competitive environment. The first task is to examine the literature on strategy for examples of concepts relating to strategic positioning.

7.1 Strategic Positioning

Strategic positioning refers to an organisation's ability to place itself consciously in relation to the forces that operate in that environment by carrying out strategic manoeuvres. Since all of the organisations in the environment are attempting to balance the same forces, they cannot remain neutral in their relationship with one another (Porter and van der Linde 1995). They will therefore adopt one of two basic strategies in seeking to establish a strategic position, namely competition or collaboration. This act forms the basis of competition in the market (Porter 1985), and the drive to change this basis is one of the major business drivers in a variety of industries around the world. Examples of such efforts are reported in the case of Australian high-technology companies (Liao and Greenfield 1997), health care firms in the United States of America (Scanlon *et al.* 1997), manufacturing companies in Europe (Freund *et al.* 1997), businesses in the Finnish food industry (Hyvonen and Kola 1995) and airlines in the United States (Monterio and Macdonald 1994). Each organisation will have a competitive scope and is, 'in essence...the range of markets, locations, channels and products within which the firm chooses to compete' (Porter 1985 p. 55). Each organisation will have a characteristic way of operating within the limits of its competitive scope, a generic product/market strategy with which it will seek to distinguish itself from its competitors.

7.2 The Competitive Environment

Industry competition theory seeks to explain the working of the environment within which organisations operate, and Porter's industry competition analysis (ICA) framework has had an enormous impact upon the application of this theory. The model has been used to describe the strategic importance of IT applications in US organisations (Parsons 1983a), the strategic role of inter-organisational systems (Volkoff *et al.* 1999), the links between corporate strategy and IT (Bacos and Treacy 1986) and the strategic risks to IS development (Vitale 1986). Porter's model is a 'convenient and useful tool for

communicating the potential of IT to managers and practitioners' (Boon 1988). As extended by others (Porter and Millar 1985, Cash and Konsynski 1985, McFarlan 1984) it is used to suggest ways in which IS/IT applications may have strategic potential and to identify mechanisms by which strategic objectives may be achieved. Earl (1989) summarises this work and suggests two further uses for the framework: identifying strategic applications of IS/IT and testing competition ideas against predetermined business objectives. To frame a competitive strategy, a business must understand the forces that operate in its particular industry and predict how they are likely to affect the business in pursuing its overall business strategy (Floyd and Wooldridge 1990). The five forces are intra-industry rivalry, the bargaining power of buyers and suppliers, the threat of new market entrants and the threat of product/service substitution (see Figure 7.1).

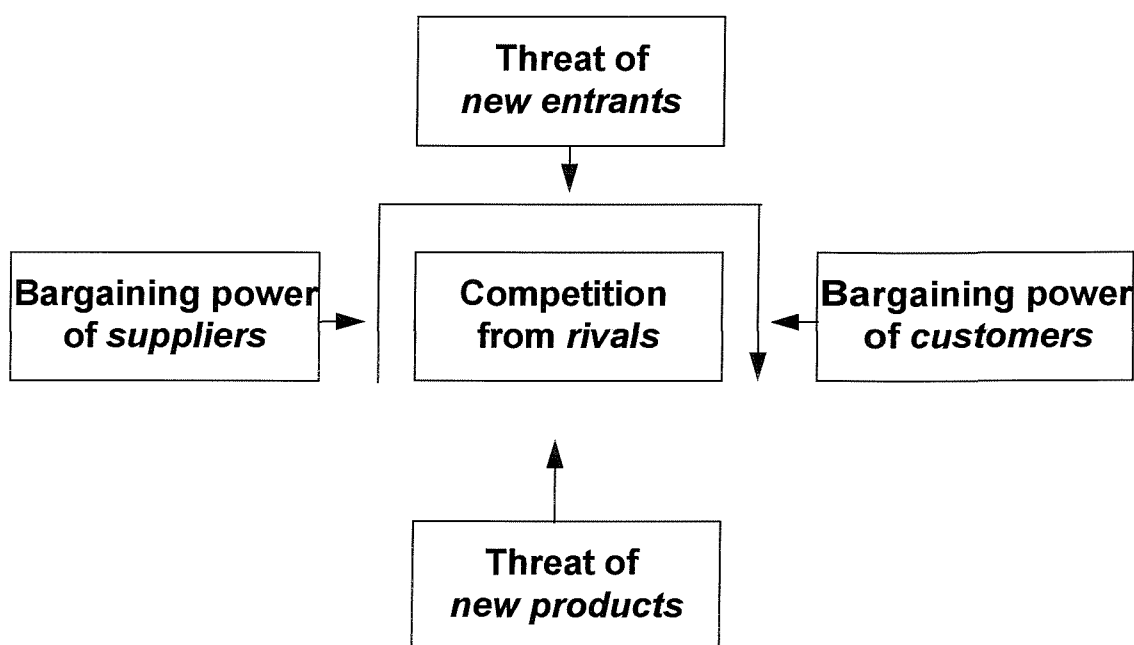


Figure 7.1 The Industry Competition Analysis Model (after Porter 1980)

7.2.1 Intra-industry Rivalry

This force deals with the nature and degree of competition between the firm that provide equivalent products or services in an identical market and has been considered the most powerful or influential of the five forces (Peppard 1993). It is placed at the centre of Porter's model, being affected by (and in turn affecting) the other forces and is regarded as continuous where the other forces operate occasionally. The force of rivalry is not necessarily based on competition in the pure sense (Jarvenpaa and Ives 1993). There are many examples in the literature of joint strategies being developed by firms who are rivals

in the normally accepted sense. Such strategies may involve collaboration on individual projects, (Clemons 1990b) or long-term business alliances (Hamel *et al.* 1993).

7.2.2 Bargaining Power of Buyers

In most industries this is a variable factor which can to some extent be controlled by the generic strategies which are adopted by the firms that supply them. This force is important from a strategic point of view, as a high level of buying power in a homogenous customer base can force firms into pursuing a cost leadership strategy (which may not be any of their interests). As a buyer of raw materials and services itself a firm will seek to exercise maximum buying power over its own suppliers. IS/IT has a role in exploiting this force as it can be used to set up channels of distribution which effectively 'tie in' buyers. This can be done by creating switching costs as in the case of McKesson (Clemons and Row 1988) and Baxter/AHSC (Senn 1992), or by sharing infrastructures as in the case of the Ford Motor Company (Gooding 1988).

7.2.3 Bargaining Power of Suppliers

This factor is important because the competitive posture of companies within an industry is formed by the power of the key providers of products and services within the industry (Callon 1996). Such power can exist where a supplier has a monopoly of a unique or scarce product or service (i.e. maximum differentiation) and can therefore (in theory) dictate its own price and delivery terms, which should result in more profit in return for a poorer service. IT has a role in changing the rules or disproving this theory, through its role as a service enabler. This is seen in the case of Midland Bank's First Direct telephone banking service which was the first to offer a continuous telephone banking service by using a sophisticated computing and telecommunications system (Peppard 1993). IS/IT may also be used to lock in suppliers by creating switching costs in the supply chain by improving customer service (Fearon and Phillip 1999, Knutton 1996).

7.2.4 Threat of New Entrants

This is an area where the interests of the rivals in an industry coincide, as new firms entering a market will share some of that industry's profit and cause the average profitability to decline. IS/IT has a strategic role in resolving this competitive situation by erecting barriers to entry by establishing a level of service or value that will be difficult to reproduce, for several reasons. First, strategic systems involve huge economies of scale, as they are often large-scale infrastructural systems which can only be developed and operated by firms with the most substantial asset base as in the case of AHSC and Johnson and Johnson (Vitale 1986). Second, a substantial element of brand preference and user loyalty must be overcome, since users are reluctant to switch to alternative IS/IT

applications which have a different interface and which may involve retraining and other physical disruptions to business. Rather than being able to bring an innovation strategy to bear, a follower organisation may therefore have to face the difficulty of giving its system the functional appearance of the system it is trying to overtake. In such cases it must still offer some perceived advantage to the user, as in the case of Thomson Holidays and Horizon Holidays (Feeny 1988). Third, the high capital requirements of strategic systems development makes it expensive for competing firms to enter a segment of the market which is being disputed through IT (e.g. Runge and Earl 1988). Fourth, first-movers developing applications that control the channels of distribution in an industry make it difficult for potential competitors to bring their products or services to the notice of potential customers. as in the case of Baxter/AHSC (Vitale 1986) and McKesson (Clemons and Row 1988).

7.2.5 Threat of Substitute Products or Services

This factor represents the user's propensity to use a rival or newcomer firm's IS/IT application in preference to the one it is using at the moment. Substitution appears to be a particularly strong positional force in relation to strategic systems for several reasons. First, it is by definition a competitive arena for innovation in terms of the development and distribution of new products, services and channels of delivery. Second, systems developers seek to develop applications which erect or demolish barriers to entry through creating or bypassing switching costs and customer loyalty features. Third, strategic systems often carry the major strategic thrust of the organisations which develop them and are therefore subject to massive investment in securing increased market share by pursuing differentiation or any of the available generic strategies. According to Porter, the way a SBU reacts to and exploits these forces will be governed by its perception of the basis of competition which exists in its environment at a given time and the relationship between this basis and the organisation's generic product/service marketing strategy. Understanding these factors is therefore of major relevance to the type of strategic IS/IT applications that the organisation will develop and the way organisations operate within this competitive environment forms the basis of competition.

7.3 Basis of Competition

The concept of competition has been studied in relation to specific business functions such as research and development (Liao and Greenfield 1997), marketing and advertising (Fruchter and Kalish 1997) and concurrent engineering (Swink *et al.* 1996). Further, competition strategies can be seen in operation at national, industrial and business level (Porter 1990, Parsons 1987). Clearly the prevalence and diversity of these examples

makes it necessary to explore and to define more explicitly the concept of the basis of competition. The seminal work in the area is by Porter, who points out that,

[Competitive advantage grows] out of the value a firm is able to create for its buyers. It may take the form of prices [which are] lower than competitors' for equivalent benefits or the provision of benefits that more than offset a premium price. Competitive advantage is at the heart of a firm's performance in competitive markets. After several decades of vigorous expansion and prosperity, many firms have lost sight of competitive advantage in their scramble for growth and ... diversification. Today the importance of competitive advantage could hardly be greater.

(Porter 1985)

This implies that the use of competitive advantage in order to secure a strategic position is at the core of the business strategy of many firms (Sethi and King 1994). A competition strategy is not just about the blind pursuit of profit and the focus of such a strategy will vary (i.e. be flexible), although the vision which drives it will remain constant over time (Wiseman 1987). The possible strategies are competition (which embraces pre-emption and imitation) and collaboration or alliance. There are many examples in the literature of companies seeking to dominate their market by having the largest single market share as in the case of Thomson Holidays (Feeny 1988) or aiming to exceed the performance of specific rivals as in the case of Komatsu (Bartlett and Ghoshal 1994). This is the definition of competition that seems most usually accepted and the majority of the examples of its use relate to pre-emption as the method of changing the basis. Pre-emption refers to an organisation's ability to achieve a measure of competitive advantage over the other by producing successive system developments and enhancements before the other could respond. There is strong evidence of the success of a pre-emptive first mover strategy, as the strategic systems developments which affected their business sector to the greatest degree were those that were introduced first. The AA Sabre and United Airlines Apollo strategic systems (Vitale 1984) were in direct competition, since potential passengers were prone to fly on whichever airline was able to book them on the first suitable flight. Sabre was the first to gain widespread acceptance with travel agents when the agents and the airline companies failed to agree on a nation-wide reservation system (Emery 1990). As AA already had plans to develop its Sabre system in this direction and was therefore able to pre-empt the actions of its competitors (notably United Airlines) and to control the booking channels of a large part of the US. air travel industry. AA once more conceived a pre-emptive strategy of developing Sabre so that it could process reservations for its competitors for a fee, and this service, as well as allowing AA. a measure of control over its rivals became an important new form of revenue that amounted to almost 50% of profits in 1991 (Senn 1992). This lead to the development of

Sabre Technologies as a profit centre in its own right (Button 1995). AHSC and McKesson were the first in their respective sectors of the US pharmaceuticals industry to create an IT-based distribution network to lock-in customers, and in the US financial services industry Merrill Lynch achieved a pre-emptive move with its innovative IT-based CMA product (Boon 1988).

Although it is claimed that first mover organisations may enjoy a considerable advantage in exploiting its competitive scope (e.g. Porter and Millar 1985, Rackoff *et al.* 1985) it is equally apparent that imitation is a viable competition strategy under many circumstances. Indeed it has been estimated that over 90% of SIS initiatives are imitative in nature (Land 1991) and Schnaars cites examples of imitative strategies from the US. financial industry such as the Docutel automated teller machine (ATM) and the Diner's Club credit card (both of which were superseded by more successful imitators) to show that 'the benefits of innovation and early market entry have been grossly oversold' (Schnaars 1996). Song and Parry (1992) stress that it is important to imitate the right things, pointing out that the Japanese have imitated US technology but have applied in innovative ways. Schnaars claims that copying strategic systems carries more risks than copying physical products and that Western attempts to imitate Japanese systems failed because, 'processes, procedures and strategies are culturally bound. It is much more difficult to reverse engineer such intangibles than it is to copy physical products' (Schnaars 1996). Examples of companies which failed to sustain their advantage include Federal Express Corporation, which created a whole new competitive space with its COSMOS overnight delivery tracking system, only to have its advantage wiped out as a number of companies sought to exploit the new overnight market by developing competing systems. These follower companies, including Airborne Freight Corporation, Emery Air Freight and United Parcels Service, had the advantage of being able to observe the functional weaknesses of the COSMOS system and to take advantage of more recent technological developments. Federal Express, therefore, did not find that changing the basis of competition by using a strategic information system gave it the degree of long-term advantage that might have been expected. Having developed its system as part of a strategic plan, while the other systems were developed as *ad hoc* responses to its initiative, Federal Express may in fact have borne the research and development costs for the entire industry in return for a temporary competitive advantage (Palvia *et al.* 1992). Dos Santos and Peffers (1991) confirm this situation in their analysis of IT adoption by US banks, where smaller banks and banks with a slow rate of growth were not able to make gains from the early adoption of IT. The need to defend a strategic initiative against imitation means that organisations must take account of sustainability in establishing a strategic position. The problem with a strategy of competing through strategic systems development is that, in all but a few well-

reported cases, 'imitability' is prevalent and pre-emptive manoeuvres are difficult to sustain (Kettinger *et al.* 1994, Lipmann and Rumelt 1982).

This means that a viable strategic alternative to step-by-step pre-emptive/imitative competition is often sought, and in these circumstances collaboration is a viable strategy for changing the basis of competition. Rival firms will therefore tend to recognise the force of competitive necessity and seek to call a truce by developing joint strategic IS/IT applications. There are also other forces that can combine to make strategies of collaboration between rivals more common than may be supposed. First, the literature search suggests that a dominant firm will seek to control the industry infrastructure or channels of delivery and rivals may collaborate as a defensive response (Hamel *et al.* 1989). Second, collaboration is an obvious way for small organisations to acquire the necessary economies of scale and technological resource base or to circumvent legislative restrictions. Merrill Lynch, collaborated with Banc One to provide the current account and credit facilities for its CMA system, as existing US legislation did not allow an investment bank to offer such services and Banc One had the necessary technological expertise which Merrill Lynch lacked (Boon 1988). Philadelphia National Bank (PNB) also used collaboration as a way of enabling its MAC shared ATM system to overcome the first-mover advantages and scale effects which were enjoyed initially by Girard (later Mellon Bank) in the Philadelphia banking business with its George ATM system. PNB maintained ownership of the network and was able to attract enough banks into its MAC network for the system to overtake George (later called Cashstream) and PNB eventually absorbed Cashstream when it took over Mellon Bank's operations (Clemons 1990).

7.4 Competitive Scope

The room for manoeuvre that an organisation has in changing its strategic position through competition is termed competitive scope. In essence, competitive scope defines the range of markets, locations, channels and products within which the firm chooses to compete (Feeny and Ives 1997) and Porter identifies four types of scope: geographical, segmental, vertical and industrial or market scope (Porter 1985). An example of the exploitation of geographical scope is RHP Ltd, a UK industrial bearing manufacturer that used its special familiarity with UK technology standards and trading methods to overcome a threat to its market share from a major European competitor. The European competitor had established electronic links to the offices of major bearing customers in the UK by using the same strategic system as it used in the rest of Europe. RHP's more 'UK-friendly' trading system quickly won back its market share and its competitor, having little incentive to tailor its system to suit the needs of a relatively small geographical sector, did not respond effectively (Earl 1989). The case of Thomson Holidays illustrates well the

successful exploitation of 'segmentation scope'. In the 1980s Thomson had the largest market share in the UK travel industry, with the greatest range of tours and holidays on offer. It was, however, lagging behind in its use of technology, and a smaller, younger rival initiated a pre-emptive move to install direct IT links to UK travel agents which could have posed a considerable threat to the market leader's operations. Thomson was, however, able to combine its existing product-based market dominance and its knowledge of the holiday market with a newly found recognition of the strategic potential of IT to introduce its TOPS system. This came to dominate the UK travel industry until Horizon Holidays countered by introducing a functionally similar system (Feeny 1988).

The use of vertical scope to achieve strategic manoeuvres successfully is illustrated by AHSC and McKesson's, and unsuccessfully in the case of Remington tyres (Targett 1993) and Olin Chemicals (Senn 1992). The latter two strategic system failures (among the few which are reported in the literature) are examples of a failure to explore and define the strategic scope before initiating the manoeuvre. Remington's system had similar features to both AHSC's and McKesson's, but its management had not appreciated the difference between integrating with a disparate customer base consisting of large number of weak drugstores with little IT experience and a few powerful, well-organised car manufacturers with enormous IT budgets. Industry scope is defined as 'the range of related industries in which the firm competes with a co-ordinated strategy' (Feeny and Ives 1997). Examples of the exploitation of industry or market scope through IS/IT are rare in the literature, in spite of the prevalence (particularly in the UK) of multi-industry conglomerates among the list of top-performing companies. A thorough knowledge of a firm's strategic scope appears to be an important precursor of successful strategic applications of IS/IT (whether pre-emptive, imitative or collaborative). Competitive scope is therefore an important component of strategic positioning as it is a precursor to setting a product/service strategy, with which the organisation will seek to achieve a desired strategic position.

7.5 Product/service Strategy

Porter (1980) contends that organisations pursue a defined set of generic strategies when trying to establish a strategic position through its products and/or services. These strategies are: cost leadership, differentiation and niche marketing, and, possibly, product/service innovation:

7.5.1 Cost Leadership

A strategy of cost leadership means that a firm will choose to offer products or services which are equivalent to those of its rivals, but will attempt to undercut them on price. It may do this by the manipulation of factors such as economies of scale, tight control of

business processes, proprietary knowledge and alliances in support of minimum-cost operation (Callon 1996). Most organisations will avoid adopting this strategy, as there can, by definition, be only one winner and the sustainability of any cost advantage depends on controlling the cost drivers that underlie the strategy (Porter 1980). The use of IS/IT in support of an out-and-out cost leadership strategy is not common at the industry level. Exceptions exist in UK banking, where IT is seen as a central plank of a strategy of cost reduction through de-staffing (Lamond and Davis 1991), and the US timber industry, where such strategies are found to prevail due to the homogeneity of the products and services (Bush *et al.* 1991). There are also many examples of the use of IS/IT to reduce and to control operating costs in support of other strategies (notably differentiation). These are present in applications as diverse as Japanese research and development companies (Liao and Greenfield 1997) and German mass production companies (Corsten and Will 1994). They are also used in controlling energy costs at a German steel-works (Frizen 1995), in reducing inventory costs in a UK brick works (Bradshaw 1990) and a Scottish casual garment manufacturer (Cookson 1990).

7.5.2 Differentiation

In pursuing a strategy of differentiation a firm will seek to add value to its products or services or invest them with attributes which are especially valued by buyers. Many firms find this strategy more acceptable than cost competition, as they are likely to accrue higher earnings and will incur lower costs in controlling their business operations (Ward and Peppard 1996). Differentiation appears to be the most common strategic application of IS/IT. There are examples in the literature describing the use of IS/IT in support of value-adding activities which have superseded cost leadership in the US retail sector (Vance and Roy 1994) and the UK manufacturing industry and motor industry (Gooding 1988). The use of IS/IT as a channel of delivery to provide a high level of differentiation features in many of the classic strategic IS/IT case-studies, such as McKesson's Pharmaceuticals (Clemons and Row 1988), Federal Express (Palvia *et al.* 1992) and Thomson Holidays (Feeny 1988, Earl 1989).

7.5.3 Niche Marketing

A strategy of niche focusing involves identifying a particular market sector and satisfying the expectations and the needs of buyers in that sector more effectively than any rivals can. An effective niche focus can be achieved through either of the above strategies, in other words being the lowest-cost supplier in that sector or offering differentiating features which will command a price premium. There are a number of examples of IS/IT being used to identify and to exploit niche markets through the strategic use of IT in the US

retail sector at 7-Eleven (Kotabe 1995) and Frito-Lay (Callon 1996) and a floral produce distributor (Becker *et al.* 1997).

7.5.4 Product/service Innovation

Some researchers (e.g. Boyett and Boyett 1995) have identified innovation as another generic marketing strategy. An innovative company must continue to produce new products or services for its existing markets or identify new markets for its existing products. An innovation strategy is based on the fact that a unique product needs no differentiation, that the firm that produces it has automatic cost leadership and a new market implies a large strategic scope. The strategy implies high research and development overheads, and requires visionary management and considerable organisational flexibility. IS/IT may have many strategic roles in support of this type of strategy, either directly as the product, as an innovative channel of delivery (e.g. Clemons and Row 1991), in support of visionary management (Fredericks and Venkatraman 1988), or in enabling flexibility (Volberda 1997). In addition to innovation, growth and alliance have been suggested as generic strategies which are associated with market factors (Wiseman 1985), and IS/IT are important in enabling these strategies, as in the airline business (Yousef and Hansen 1994).

7.6 Requirements of a Strategic Positioning Method

The objective of this stage of the research is to propose a suitable mechanism for defining the strategic position, competitive scope and sustainable advantage that an organisation has in developing strategic IS/IT applications. It possible to define two requirements:

- To suggest a method or a series of activities which will assist an organisation in identifying and securing a valuable position in a competitive environment through the strategic use of IS/IT;
- To suggest a set of techniques that will assist in carrying out the individual tasks which are involved in the process of strategic positioning (e.g. defining competitive scope).

There is clear indication of the need for such a method. Evidence from the strategic planning domain of organisations which have achieved and maintained an advantage in their industry sector (e.g. Palvia *et al.* 1992, Clemons and Row 1988) suggest that many companies that realised this advantage benefited from several factors. These include a clear strategic intent, knowledge of the competitive arena and the factors that sustain the advantage, as described in the following section.

7.6.1 Clear Strategic Intent

The successful organisations were clear about the generic strategy that they were following. In most of the classic examples, companies such as AA, Federal Express and

McKesson's had a clear view that they wished to differentiate themselves from their competitors, irrespective of how that differentiation is achieved, or whether IS/IT is involved at all. Other examples such as Wal-Mart (Vance and Scott 1994) were equally clear in pursuing cost leadership. The IS/IT applications were conceived as secondary supports (e.g. DP or transaction processing systems) to strategies of cost leadership. However, other strategic benefits from the use of such systems were actually side effects resulting from the original strategic intent. This is a characteristic of strategic benefits. It seems to be more common to exploit 'spin-off' benefits than to plan them in advance.

7.6.2 Knowledge of the Competitive Arena

The majority of successful companies were equally clear about the competitive forces that operated in their environment and were able to exploit this knowledge by developing strategic manoeuvres quickly to achieve their objectives. This short-term, incremental mode of development called *bricolage* (Ciborra 1991) appears to be the predominant way of developing strategic IS/IT applications, rather than a slavish commitment to a long-term IS/IT strategy. The opportunities that lie behind these strategic thrusts can be identified through a process of environmental scanning. Although few details of the methods that the organisations used are available, the majority of examples show signs of responding to the competitive forces in their environment (Eardley *et al.* 1996, Avison *et al.* 1997).

7.6.3 Sustaining Factors

In the cases of successful competition, actors were in place which allowed the organisations to sustain a pre-emptive strategic position (and therefore the competitive advantage) which they achieved from their strategic manoeuvres. There is a strong suggestion that some of these factors were not directly related to the use of IS/IT, such as the structural differences that relate to the firm (Clemons and Row 1991) or the strength of its resource or asset base (Kettinger *et al.* 1994). In a significant number of cases such as AA (Hopper 1990), AHSC (Senn 1992) and Merrill Lynch (Boon 1988) there is clear evidence that IT had a role in sustaining the advantage. It is logical to conclude that identifying the possibility of the imitation or circumvention of a strategic manoeuvre should be an important part of the proposed strategic positioning framework. The next phase of the research in this area is therefore to examine the literature for existing methods, frameworks or techniques that have been or can be used for carrying out competitive manoeuvres or achieving and sustaining a valuable strategic position.

7.7 Strategic Positioning Methods

The literature search identified several methods that, while not originally intended for strategic positioning use in an IS/IT context, do have some features that are relevant to

the current research (e.g. Davies 1993, Argenti 1980). One method which is intended for use in a strategic IS/IT environment is the strategic options generator (SOG), developed at Columbia University as a practical tool for identifying strategic opportunities (Wiseman 1985). The SOG frames a series of questions in the form of a checklist for guiding the decision-makers in a way that will, in theory, identify an IS/IT application that will achieve a strategic target. The model is linear and the 'use of information systems becomes more obvious and more significant as you progress through the model' (Callon 1996). As Earl states, 'the potential value of the option generator is not only in its conflation of previous frameworks of analysis, but the logical list of analytical questions it provides' (Earl 1989 p. 58). The theories on which the SOG is based include Chandler's strategies of growth (Chandler 1967) and Porter's work on generic strategies (Porter 1980) but the SOG places them within a framework which is capable of being focused and applied to specific strategic manoeuvres involving IS/IT. The model first seeks to identify strategic targets which companies can choose when using IS/IT to gain a competitive advantage. The target represents management's main purpose in initiating the strategic manoeuvre and assumes that one of the main components of a business strategy (e.g. a corporate vision with clear strategic intent) which would support the manoeuvre are already in place. The logic behind the next stage, defining the strategic thrust, is to apply one of the generic strategies to the target.

The strategy (e.g. differentiation) which shows how the target is to be approached represents the long-term character of the company, (which is unlikely to be influenced by the use of this framework) but it would appear that a more temporary strategy can be adopted, especially for the current strategic initiative. Indeed, there is nothing to suggest that the strategies on which the strategic thrust is based must be single or that their use is mutually exclusive. This reflects industrial practice, as it would appear from the literature search that many organisations regularly employ several strategies simultaneously (e.g. growth and innovation). The 'mode of use' section of the model deals with a fundamental aspect of the company's strategic posture. It is linked to the risk profile of the organisation, in that first mover organisations carry the greatest degree of risk (for the greatest potential reward) and the choice of mode places upon the organisation the responsibility for sustaining the advantage. This is therefore a very important decision and not to be taken lightly, but the framework does not offer any assistance in assessing the risk or in building entry barriers to secure any advantage which may be achieved. Also, it is suggested that the 'direction' of the manoeuvre is chosen by identifying the end-users of the system, as 'if the users are within the boundaries of the specific company, then the answer is use. If the use of the system extends beyond the boundaries of the company that is providing the...system it is provide' (Callon 1996 p. 153). This seems to be excessively

simplistic given the role of strategic systems in changing organisational boundaries (Bensaou and Venkatraman 1996) and the problems of identifying the end-users of IT systems. Equally little guidance is given by the model regarding the execution stage, but it must be assumed that the SOG is intended to be linked to a conventional systems development method, or as input to a SISP method such as Summit-S or IE (Martin 1989). In summary, the SOG has several major limitations that weigh against its use as a strategic positioning method. First, it lacks depth and powers of analysis due to its checklist format and simplistic techniques.. Second, it has an internal focus in that the environmental scanning aspect is limited to identifying the strategic target and important influences on strategic position, such as innovative products or services, new entrants to the market and the actions of rivals are ignored. Most importantly, perhaps, although it guides the move to a strategic target, it lacks reference to the maintenance of any advantageous position that may be achieved.

Peppard (1993) suggests a method for a process of identifying IS/IT opportunities which is, conceptually, not dissimilar to strategic positioning. Peppard's method includes three techniques which 'may be used in combination as appropriate' (Peppard 1993 p. 91) but which are indicated in the model as working in parallel. This would appear to offer greater flexibility than the previous linear models. The techniques used in Peppard's model are the industry competition analysis (ICA) and value chain analysis (VCA) models (Porter 1985) and the critical success factor (CSF) technique (Rockart 1979). The outcomes from the application of each of the three techniques are combined to prompt a series of questions based on the work of McFarlan (1984) and Porter and Millar (1985) which are intended to aid in identifying IS/IT opportunities. The model meets many of the requirements for a strategic positioning method, as it includes an environmental scanning technique (the ICA model), attempts to link with other components of the strategic process (through CSF analysis) and recommends opportunities to use IS/IT strategically. It is, however, difficult to perceive the philosophical or theoretical basis of the method, and, as with the SOG, it lacks a methodological approach to sustaining the advantage once it is gained.

Lessons from history (e.g. Cecil and Goldstein 1990, Copeland and McKenney 1988) appear to indicate that sustaining competitive advantage is likely to be considerably more difficult than achieving it. Feeny and Ives (1990) suggest a conceptual model which they call a 'framework for determining sustainability', which is intended for use with strategic IS/IT applications and which, like Peppard's method is based on three separate analysis exercises, although in this case they are to be carried out in sequence. First, project life-cycle analysis is carried out to establish the probable development time of an equivalent

system developed by a competitor using the industry-standard technology. This is to establish a generic lead-time that is the minimum time before a follower company can become a direct competitor. The technique is based on comparing the project life cycle of the first-mover company with that of a hypothetical follower company (see Figure 7.2).

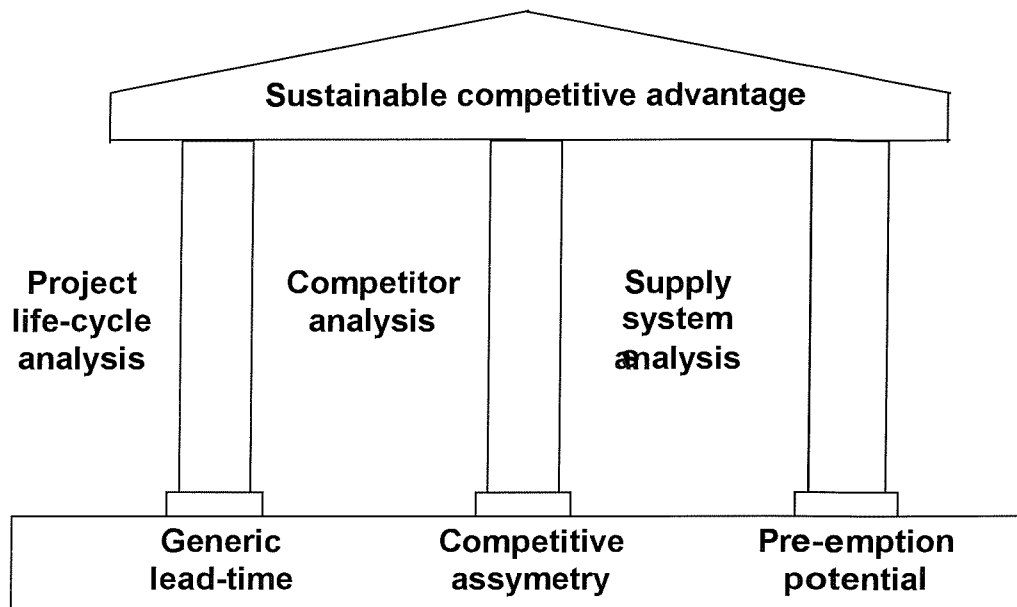


Figure 7.2 Competitive Advantage Framework (Feeny and Ives 1997)

It should be noted that the first mover has responsibility for developing the vision or idea behind the strategic development, which can be a complex and lengthy process in its own right. It has been pointed out that the duration of the second stage of the first mover's life cycle (i.e. gaining approval for the system development) can vary enormously according to the attitude of the organisation. In some firms the management appears to be primed to approve strategic initiatives quickly, while in others strategic systems are not subjected to the same processes of approval as are other candidate systems (Lockett 1996, Runge and Earl 1988, Ives and Vitale 1988). For the first mover the build phase of the life cycle may be longer for strategic systems due to their unfamiliarity and the degree of technological innovation involved (Feeny and Ives 1997, Zhuang 1995). After the launch of the strategic initiative the first mover has to go through a lead time phase during which the strategic effects of the system are observed (e.g. market share is built, alliances are formed or customers/suppliers are locked-in to the system. According to Feeny and Ives' model it is during this phase (i.e. when the system's effects are observed by competitors) that the follower company's life cycle begins. There is a phase called 'awakening' during which

the follower becomes aware of the first mover's system, perceives its significance and organises itself to respond. As the remaining phases of the follower's life cycle are the same as the initiator's (i.e. winning approval, building the system and launching the project) it is apparent that the follower's life cycle lacks two phases of the first mover's and will therefore have a shorter duration. 'Followers require no vision or planning process. Instead, they become aware of the change in the playing field and aroused as they begin to recognise the unfavourable tilt of the field' (Feeny and Ives 1997). This is a good demonstration of the application of two of the forces of Porter's ICA model (Porter 1980), as the first mover has effectively changed the basis of competition and has erected a barrier to entry. It should be pointed out that, although the build phase is common to both players, the follower organisation may have an advantage in this phase, as the initiator will have done most of the pioneering work in the field. There is a body of evidence suggesting that the resource-based barriers to entry are not as effective as may be thought (Mata *et al.* 1995, Kettinger *et al.* 1994). Resources (particularly those relating to IS/IT) are variable and subject to redistribution - although the implication exists that IT management skills are less transferable than IT technical skills (Mata *et al.* 1995). Barriers based on innovation are also unreliable in terms of establishing and sustaining strategic advantage (Kettinger *et al.* 1994) due to the imitability of technological developments. Clemons and Row (1991), citing the provision of ATM systems by banks, argue that the net effect of this develop-and imitate cycle is that the market in general benefits, rather than individual rival firms (Jurison 1996).

7.8 Competitor Analysis

A competitor analysis exercise is included in the model, and is intended to identify the extent to which the strategic initiative is enhanced through competitive asymmetry according to their degree of competence. The greater the degree of asymmetry, the more difficult it will be for competitors to copy a strategic move, but the source of the asymmetry is also important. Strategic systems projects that rely on generic lead-time to maintain competitive advantage are the most at risk from imitation (Feeny and Ives 1997). Non-IS/IT factors appear to be crucial in sustaining competitive advantage, such as the presence of technological and business management skills, the size of the market share, the appropriateness of the generic strategy and the strength of the resource base (Ives and Vitale 1988). The theory of monopolistic competition (Cheung 1998) describes competitive positioning among companies which have significant distinctiveness in terms of the above factors, particularly the resource and asset bases. In the case of a business showing a high degree of asymmetry, an imitator must not only replicate the system, as did Horizon Holidays (i.e. catch up on the lead-time), but must overcome the source of asymmetry (e.g. by duplicating the market share or asset base). This approach to strategic

systems development is analogous to the use of distinctive competence in setting business strategy (Gupta and Cawthon 1996). In the Feeny and Ives scheme, life-cycle analysis is intended to indicate the head start over its rivals which a strategic initiative may have (i.e. the lead-time), and competitor analysis indicates the extent to which the competitor will be able to duplicate the application.

7.9 Supply System Analysis

This technique examines the upstream and downstream elements of the supply chain to establish three key points. First, it seeks to identify exploitable links or points of focus where a manageable number of factors can give control of the supply chain, such as the booking agents in the case of AA's Sabre system (Hopper 1990). This becomes a target group for the strategic initiative. Second, it must suggest IS/IT mechanisms which will 'propel the business into a unique and superior relationship with that group' (Feeny and Ives 1997). Again, the greater the degree of uniqueness and superiority, the more difficult it will be to duplicate or imitate the IS/IT application. Third, an analysis of the supply chain may indicate where switching costs can be used to secure the pre-eminent position for a period of time which will satisfy the strategic requirements of the organisation. According to Feeny and Ives (1997) switching costs can be identified into three general categories. First, at the level of the application interface, by exploiting the users' aversion to 're-learning' a new system such as in the case of Thomson Holidays (Feeny 1988) and second, at the level of the organisation's dependence on the system (McFarlan and McKenney 1983). Third, it can be identified at the level of the community of users, which implies that the target group will behave as a homogeneous body. Where the system developer can create this homogeneity, 'individual defections to a follower system become most unlikely...only wholesale defection makes sense, and that will only be organised if the user community as a whole loses faith in the prime mover's system' (Feeny and Ives 1997 p. 57).

7.10 The Recommended Strategic Positioning Method

The recommended strategic positioning method is based on the framework for determining sustainability (Feeny and Ives 1997), with some additions and modifications (some taken from other methods or frameworks in the literature search) which, it is suggested, will overcome some areas of weakness in the Feeny and Ives method. These weaknesses are identified here:

- The **method in general** assumes a detailed knowledge of a rival or new entrant's internal development and operational processes, without seeking to identify such competitors as a preliminary;

- The **project life-cycle analysis** phase begins with a vision/idea which is actually the input from another process (i.e. the vision process), but the framework jumps straight to the 'win approval' activity (Feeny and Ives 1997) without assessing the impact or risk of the development;
- The **competitor analysis** phase concentrates only on those rivals who are deemed to be capable of framing a response. In this sense it deals only with situations in which the firm using it is the *pre-emptor* (i.e. in situations of opportunity). There is no suggestion that it can be applied to situations in which the threats are posed to the firm either directly (i.e. from the actions of rivals or new entrants to its market) or indirectly through alternative uses of IS/IT as innovative products or services;
- The **supply system analysis** phase attempts to analyse the extent to which the competitive position can be sustained, and hence is central to the objectives of the model. However, although the framework identifies 'the three components of successful pre-emption' (finding the exploitable link, capturing the pole position and keeping the gate closed) it does not prescribe techniques for achieving these objectives (Feeny and Ives 1997).

Nevertheless, the Feeny and Ives framework is felt to offer the most potential of those examined, and to form a sound basis for a strategic positioning method. It will need some modifications, such as the addition of an environmental scanning phase at the beginning of the process and second, the inclusion of specific techniques to support the existing phases of the method. It is assumed that the organisation has an explicit business strategy in place, has a defined competitive posture, and has developed generic strategies for each of its products or services. The proposed method has the following phases: environmental scanning, competitor analysis and supply system analysis, as shown in the following sections.

7.11 Environmental Scanning

The environmental scanning phase at the beginning of the method features an analysis of the impact of IS/IT developments on a firm and its relationship with its environment in terms of potential threats and opportunities. The first candidate technique which was considered for carrying out this analysis was the SWOT/TOWS analysis family of techniques (e.g. Glaister and Falshaw, 1999, Hill and Westbrook 1997), that are used in this application in a variety of business contexts, as has the associated PEST analysis technique (Robson 1997). Although these techniques have been applied with success in business planning applications, they are felt to lack the specific reference to IS/IT, the technical support and the semantic richness that the phase warrants. Porter's ICA model (Porter 1980) was also considered for use in this phase. As has been described, this model

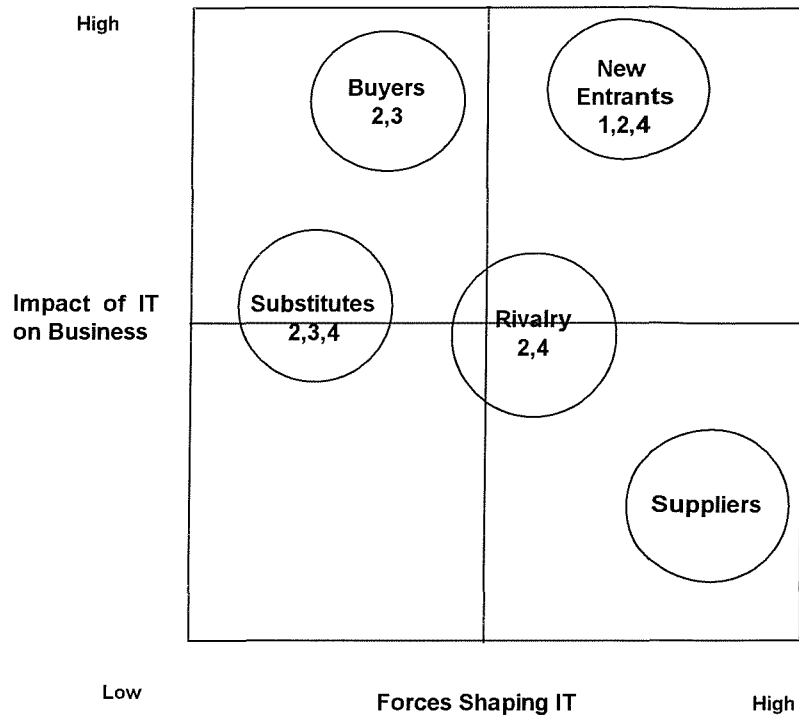
is the most commonly used environmental scanning framework and has been extended for use in a strategic IS/IT application by identifying IT potential and IT mechanisms (e.g. Porter and Millar 1985, Cash and Konsynski 1985). This modified framework has proved to be useful in helping business managers think strategically and in analysing the competitive context in which IT can be consulted (Earl 1989) and has obvious strengths in a strategic positioning application.

However, it is felt that a third technique that draws on Porter's framework was more applicable to strategic IS/IT and had greater analytical strength and richness in this application. This is the strategic IT mapping technique, developed by Parsons (1987) which is a variant of the two-dimensional mapping array which has been used in many applications (Ward 1985). In this case a strategic IT map is used to position the firm's responses to the forces of industry competition taken directly from Porter's ICA model (Porter 1980) in terms of two factors. First, on the vertical axis of the matrix, there is the impact that IT has upon these forces is assessed, and second, along the horizontal axis, there is an estimation of the functions of the business that IS/IT developments will be expected to support most strongly. Footnotes to the matrix detail the specific mechanisms that apply to the forces.

The strategic IT map has a high degree of semantic richness in representing the complexity of the relationship between the strategic use of IS/IT and the competitive environment. It is therefore a useful contribution to the strategic positioning method, for several reasons. First, it has a strong external focus, as it models an organisation's relationship with the forces in its competitive environment by using a generally accepted competition framework (Porter 1980). It extends this framework by giving it two extra dimensions, representing the relationship between IS/IT and the forces and the impact of IS/IT on the business. These are features from the widely accepted strategic grid technique (McFarlan and McKenney 1983), allowing a more complex analysis in this application than would the use of Porter's ICA model (Raho *et al.* 1987). Second, the use of 'present' and 'future' representations of these relationships allows this strategic position to be modelled over time and a prediction of the future competitive situation to be made.

This is especially useful in the context of strategic positioning, as it allows decision-makers to be proactive in planning strategic IS/IT developments. Again, the technique is superior in this context to Porter's framework as modified by Earl, which goes no further than suggesting IT mechanisms for future development (Earl 1989). Third, the strategic IT mapping technique has more potential for linking with other frameworks and processes than do any of the other techniques that are examined in this section.

US Periodical Distributor Strategic IT Map - 1982



1. Barriers to entry	3. Switching costs
2. Product/service differentiation	4. Cost advantages

Figure 7.3 A Present Strategic IT Map (after Parsons 1983a)

For instance, the vision process can provide information on which to base the 'future' IT map. This can in turn produce some input to the process of providing flexibility in IS/IT applications and infrastructures by assisting in predicting the factors with which the strategic IS/IT will cope (Broadbent and Weill 1997). This helps with planning the strategic position of the organisation, which is a necessary part of the strategy process,

Although it may seem obvious that IT applications should be consistent with the business strategy, in too many firms there is a monumental lack of attention given to understanding how IT will influence the firm's competitive position in the industry...

(Parsons 1987 p. 197)

In an example relating to a US periodical distributor (Parsons 1983a) the present strategic IT map (see Figure 7.3) is used to depict the current strategic position of the company in relation to each of the five forces, as follows. First, as is shown by the horizontal

positioning of the forces, the firm has perceived that the treat of new entrants (to the distribution market). The bargaining power of its suppliers are the forces having the most significant effect on its competitive strategy and therefore upon its strategic position (Floyd and Wooldridge 1990). The power of buyers (to influence prices and demand) is limited, due to the fragmented nature of the market. Rivalry is not a major factor, again because of the nature of the competition, and the threat of substitution is not perceived to be large. Second, the positioning of the forces on the vertical axis of the map shows that IT is already having a significant impact on buyers. This may imply a conscious attempt to reduce customer mobility by creating switching costs, while the effect of this IT use on rival distributors and suppliers is considered to be negligible.

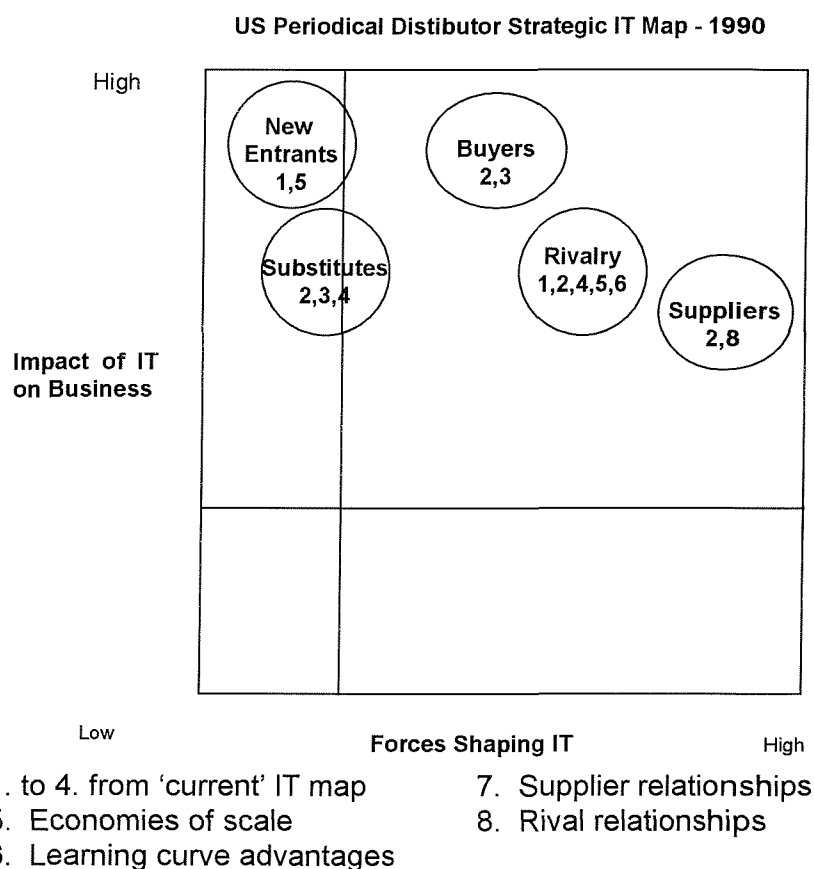


Figure 7.4 A Future Strategic IT Map (after Parsons 1983a)

In the example of the periodical distributor, the corresponding future strategic IT map (see Figure 7.4) shows that the bisector lines (which, typically, were centred on the current strategic IT map) have moved towards the origins of their respective axes. This is employed to demonstrate the effect of enlarging the area of importance of IT on the future

IT map, indicating that the firm in this case expects both the impact of IT and the opportunities to use IT for strategic advantage to increase. This aids in making decisions on strategic positioning, and is a useful part of the technique. In this example, three of the forces (intra-industry rivalry and the bargaining powers of buyers and suppliers) are clustered in the 'high-high' quadrant of the map.

In addition the future IT map shows that by the end of the time period under study the planners expect IT to have a significant effect on all the forces in terms of its competitive strategy. There are no forces present in the 'low-high' quadrant. The results of an industry-level analysis upon which the future IT map is based indicates that between the current and future maps IS/IT would have major strategic effects on the competitive environment of the US periodical distributor. For instance electronically published journals would become more widely available as substitute products, as publishers enter the distribution market by setting up direct IT links with retailers and cutting out the distribution channels, and as strategic IS/IT applications change the basis of competition by enabling both collaboration and competition. In order to initiate a response to such future scenarios, Parsons suggests using a potential IT applications (PITA) table to identify IS/IT applications (i.e. candidate projects). These can be developed to serve two of the generic product/market strategies (i.e. cost leadership and differentiation), allowing the desired future position to be achieved.

7.11.1 Competitor Analysis

Competitor analysis is about finding out the competitive scope and competitive asymmetry of rivals and new entrants to the market relies on identifying factors in the competitive environment which may affect the organisation's existing strategic position or interfere with its moves to achieve such a position. Although some of these factors will have the potential to affect all the actors in the competitive environment equally it is assumed that most of these threats to strategic position will come from the actions of rivals or new entrants to the competitive arena. This phase therefore needs techniques to support the following activities:

- **Competitor Identification**, which identifies individual organisations in a competitive market. In most cases rivals will be well known as a result of industry knowledge and experience. This knowledge, by definition, tends not to apply to new entrants and can tend to blinker managers to the dangers of innovation. The technique for use in this activity therefore needs to encourage creativity in identifying specific threats to strategic position from these sources, and even threats from less predictable sources such as suppliers and buyers (Couger *et al.* 1994). This is one of the particular strengths of Porter's ICA model, which is therefore recommended for use with this

activity. This model forms the basis of the strategic IT mapping technique in the environmental scanning phase, but in that phase it was used to identify generic forces within the competitive environment. The use of the ICA framework for competitor identification will aid a smooth transition from the previous phase;

- **Competitor Competence Assessment** which seeks to examine such organisations in terms of their competitive asymmetry or the possession of the distinctive competencies which are likely to be successful in mounting a threat. It is suggested that these competencies can come from three sets of capabilities that are internal to the competing organisation, and these are: competitive scope, organisational base and IS/IT capability (Porter 1985). It was decided that none of the techniques that were discovered in the literature search is particularly suitable for assessing competitor competence.

7.11.2 Supply System Analysis

The model suggested by Feeny and Ives includes a three-stage supply system analysis phase which includes 'finding the exploitable link', 'capturing the pole position' and 'keeping the gate closed' (Feeny and Ives 1997). The activities which are chosen within this phase of the recommended technique are based upon these activities, with a greater emphasis placed on identifying switching costs and other elements which will accentuate differentiation factors to the target group:

- **Target Group Identification**, in which the value-added process and supply chain (upstream and downstream of the prime mover) are examined for 'points of leverage'. These occur where the maximum influence upon the continued success of the system (in achieving a desired strategic position) is controlled by as small a number of strategic users as possible. This is the target group at which the strategic manoeuvre will be aimed. Examples of such strategic groups would be travel agents in the case of Thomson Holidays (Feeny 1988) and drugstores in the case of McKesson's (Clemons and Row 1990) and the position of the pressure point in the value-chain is downstream in both cases. The technique that is recommended for target group identification is a combination of value chain analysis (Porter 1985) and the target list from the SOG (Wiseman 1985) for identifying specific target groups;
- **Potential IT Applications Identification** in which IS/IT applications are sought which, in order to achieve and sustain an desired strategic position, will,

Propel the business into a unique and superior relationship [compared to rivals] with that [target] group'. IT will provide a superior relationship if, in return for the benefits provided by the application, the user will ... put the prime mover into the position of preferred business partner.

(Feeny and Ives 1997 p. 56)

It is recommended that these strategic IS/IT applications are identified by using a modified version of the Parsons potential IT applications (PITA) table (see Figure 7.5). This is adjusted to fit the Porter VCA model to allow a smooth transmission from the target group identification phase. The secondary activities, by definition, do not have matching target groups but are included in the PITA table, as IS/IT applications may be needed to operate in these areas to support the applications that serve the needs of the primary activities.

Activities	Target Group	Cost Leadership	Differentiation
Inbound logistics	Supplier A	Just-in-time system	Supplier quality
Operations/ management	Buyer B	Automated manufacturing	Flexibility
Outbound logistics	Buyer C	Electronic data interchange	Customised delivery
Marketing and Sales	Buyer D	Direct Product Profitability	Telemarketing system
Infrastructure	N/A	Planning and budgeting	Office automation
HRM	N/A	Personnel record system	Succession planning
Technology Development	N/A	Teleworking system	Corporate intranet
Procurement	N/A	Automated ordering system	Vendor rating

Figure 7.5 Potential IT Application Areas (After Parsons 1983a)

7.11.3 Differentiating factor assessment

This phase seeks to identify the factors which will maintain the positional advantages predicted in the potential IT applications assessment phase. The technique that is recommended for use in assessing the degree of differentiation is a modified version of one used in SISP (Burch 1990). The technique has three parts. First, it is necessary to identify and assess the factors that effect the applications' ability to support the strategy by giving a score out of ten. Second, the factors that effect the feasibility of the application must be identified, assessed and given a score. Totals are then produced based on these scores.

Finally, the totals for each dimension are plotted onto a differentiation/feasibility matrix that indicates the likely success of the strategic IS/IT applications in maintaining the advantage. First, for this example the differentiation factors are taken to be asymmetry (i.e. the extent of the difference between the two rival systems), imitability (i.e. the ease with which the application may be imitated) and distinctive competence (i.e. the system's match with the distinctive competence of the 'prime mover' organisation. The feasibility dimension refers to the technical, economic and legal factors that effect the prime mover's

proposed IS/IT application. The assessment of these factors is carried out using a modified version of the weighted ranking technique (Law 1988) which rates each factor out of a maximum of ten marks in order to produce a total rating for each application (see Figure 7.6).

Differentiation Factors						
IT Application	Rival	A	I	D	Total	
Supplier Quality	Company W	9	7	7	13	
Flexibility	Company X	5	8	1	14	
Custom delivery	Company Y	8	4	1	13	
Telemarketing	Company Z	9	7	5	21	

Feasibility Factors						
IT Application	Rival	T	E	L	O	Total
Supplier Quality	Company W	5	6	8	8	27
Flexibility	Company X	6	7	9	7	29
Custom delivery	Company Y	4	8	5	6	23
Telemarketing	Company Z	3	5	4	6	18

Figure 7.6 Differentiation/Feasibility Ranking Table (after Burch 1990)

In order to operate the technique the prime mover's product/market strategy needs to be known (which automatically selects the recommended IT application from the matrix) and the most likely rival (or rivals) has already been identified in the competitor analysis phase. A panel of technical and business experts using information gained from the previous phases and local knowledge of the organisation's systems development process would assess the degree of differentiation and feasibility. A high rating in a differentiation factor means that the application will be difficult for a rival or new entrant to initiate or reproduce, and a high rating in terms of feasibility means it will be easy for the prime-mover and will integrate well into the strategic IS plan. It is therefore possible for an IS/IT application to be desirable in terms of achieving a strategic position and yet be difficult, expensive or risky for the prime-mover to develop, allowing a trade-off to be made and priorities to be decided for the applications development. These decisions are aided by using a technique called the differentiation/feasibility matrix (see Figure 7.7). This is based on the priority grid used in SISP (Burch 1990). By plotting the total scores from the differentiation/feasibility table onto a two dimensional matrix (with feasibility and differentiation as the axes) the results can be interpreted as follows: first, the supplier

quality assurance system (SQA) appears in the ‘high/high’ quadrant and should therefore have a high priority for development (Agarwal *et al.* 1994). Second, the flexible manufacturing system (FMS) is plotted in the ‘low/high’ quadrant and therefore is highly feasible but will not sustain the advantage for long.

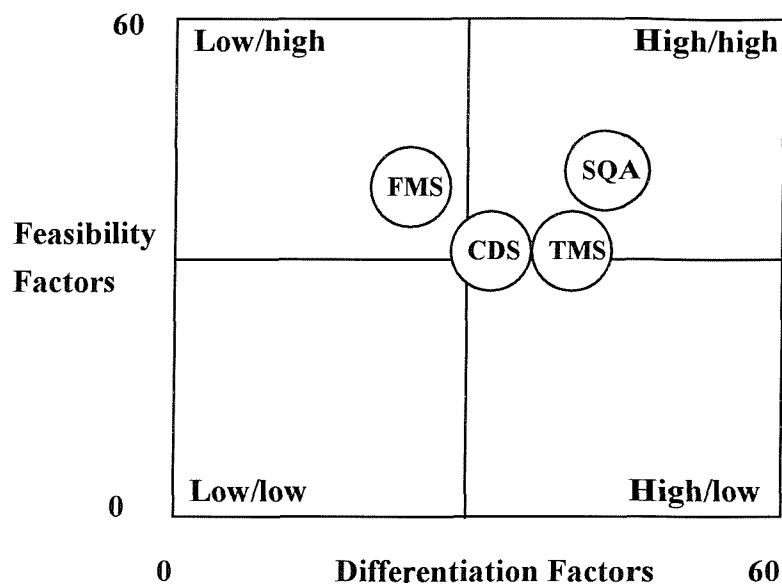


Figure 7.7 Differentiation/Feasibility Matrix (after Burch 1990)

That is not to say that this application should not be given a high degree of development priority, just that the decision to proceed should be informed by other strategic factors such competitive necessity or the firm’s IT infrastructure. Third, the customised delivery and telemarketing systems are at the intersection of the quadrant lines (i.e. the point of indifference) and can be regarded as routine system developments which will achieve the desired advantage for a satisfactory period of time.

7.12 Summary

It has been identified that strategic positioning is an important component of the strategic application of IS/IT in a variety of industries and types of company. Examples from the academic and empirical literature indicate that organisations that are successful in the strategic sense are able to determine and sustain a strategic position in their environment. It appears that manoeuvring strategically to change the basis of competition is at the core of the business strategy in many of these cases, and the selection of the appropriate strategy for this is a very important decision for such firms. Also, organisations must be aware of their competitive scope in order to determine their room for manoeuvre in seeking to achieve a desired strategic position and be able to recognise the strategic role(s)

of IS/IT in terms of their product/market strategy. In spite of the importance of this strategic component, there is a notable lack of methods for achieving and maintaining a strategic position (Avgerou & Cornford 1993). Although frameworks and techniques have been published which may be usable in this application, there is no evidence that suggestions have been made to link them into a viable method. Therefore, this section of the work suggests a method for supporting the strategic positioning component of strategy. It recommends a series of techniques that are to be used in conjunction with the deliverables from the processes that deal with the other components of the recommended strategic systems development process such as strategic vision, strategic flexibility and strategic alignment. The hypothetical component of the linkage between business strategy and strategic IS/IT development that relates to strategic flexibility is examined in the next chapter.

Chapter 8

Strategic Flexibility

This chapter looks at the changing nature of business strategy and examines a framework that will help to describe and define the role of IS/IT applications in supporting strategic flexibility. The literature search identified a number of classic cases of strategic IS/IT applications that were successful in achieving advantageous strategic positions (e.g. Hopper 1990, Clemons and Row 1988, Boon 1988). In some of these cases the advantage was not sustained because the systems, or the strategies which they supported, were not sufficiently flexible to cope with subsequent changes (Eardley *et al.* 1996). It is contended in this chapter that the escalating rate of change in business and technology development requires more responsive strategies and consequently a need for development methods that will produce more flexible strategic IS/IT applications. The main ways of providing a flexible IS/IT infrastructure are reviewed to assess their relevance to the development of flexible strategic IS/IT applications and several techniques that are judged to be suitable for developing flexibility are analysed to assess their suitability for inclusion in the framework.

8.1 The Changing Nature of Strategy

There is a clear case for re-examining the nature of strategy and the use of IT to support strategic activities. While there is no doubt that the technology available to implement strategic IS/IT applications has changed radically since the 1970s, the business world has also changed and new, more flexible approaches to strategic management are in vogue, for instance, value-driven strategies (Handler 1992). Perhaps most significantly, large-scale organisations are more comfortable with IT and many have adopted management structures to control and exploit IT in support of business goals (Rose 1988). There is evidence from such situations that greater flexibility is needed in the strategic process in the 1990s (Thompson 1993). An examination of some of the successful strategic IS/IT applications from the 1970s and 1980s shows them to be rooted in both the technology and the conventional wisdom surrounding business strategy that prevailed at the time. This is typified by competition frameworks of the 'design school', such as those of Porter (1980) and Wiseman (1985). It is suggested in this chapter that, where used without reference to a means of providing flexibility, such frameworks may have served to produce large-scale, inflexible systems. These may have supported the business strategies then in vogue, but the requirements of strategy are changing, and therefore the methods of developing systems support the strategic process need to change. Most of the classic cases of strategic IS/IT applications were based on strategies in which the manoeuvres of the

participants were fixed in the long term (e.g. contractual supplier-buyer chains) and in which economies of scale were important (i.e. the creation of entry barriers and switching costs). The trend is now towards what Tofler calls the principle of demassification, part of a major change in organisational culture that he terms 'the third wave'. This movement is a reversal of the trend that the large-scale inter-organisational systems helped to create (Cash 1987). 'The [production] runs are getting shorter, the work units are getting smaller, the locations are becoming more disbursed.... What it points toward is increased customisation, and...if you go back before the industrial revolution, that is how we produced things...virtually all production was custom production. So what we are now doing is recreating the pre-industrial age, but on a high-technology basis' (Tofler 1987 p. 15). Tofler's view of this movement embraces three concepts:

- **The adaptive corporation** which describes a company that is able to 'restructure itself into more fluid and flexible forms' (Tofler 1987 p.15), implying flexibility in strategy and technology infrastructure, exemplified by a retreat to core business processes and business process re-engineering;
- **Creativity and innovation** which are typified by statements such as 'incremental change is fine between revolutions, and radical change is what is needed during revolution' and 'Nobody has anybody to copy from anymore.... We have to invent systems and methods for coping with the situation that nobody ever [faced] before' (Tofler 1987 p. 16). There may, however, be organisations in different industries to copy (e.g. retailers might copy banks in offering financial services);
- **Strategic vision** as 'companies in the second wave' (Tofler 1987 p.15) are constrained by a market-driven mentality which induces short-term reaction at the expense of long-term proactive vision which may result in their inability to foresee and cope with future environmental conditions.

Tofler holds a view of strategy that is, to some extent, at odds with that of Porter. It is contended that the needs of the corporation of the third wave are for systems that support strategic flexibility or corporate agility rather than fixed competitive postures.

8.2 Strategy and Flexibility

The conjunction of strategy and flexibility may even imply a conflict in terms. Strategy is often seen as a fixed, long-term process and is connected to activities with a long lead-time. Evidence of the merit of new objectives or strategies is often obtainable only after considerable delay (Powell 1993). Flexibility, on the other hand, might involve two things that are not fixed: first, the organisation's ability to change direction at short notice and second, its capacity to deviate from a predetermined course of action. In either case, the term refers to a firm's 'ability to do something other than that which was originally intended' (Evans 1991). These aspects of flexibility are of great relevance to strategic

IS/IT applications. Indeed, strategic flexibility has been viewed as a critical success factor in high technology because 'products, manufacturing processes, markets, distribution channels and competitive boundaries are in a state of continuous flux' (Evans 1991). Flexibility may also be viewed as a strategic response to the unseen which prompts firms to 're-calibrate their strategies and re-focus resources on successive decisive points, often with different rules of engagement' (Bahrami and Evans 1989). A flexible strategy is usually seen as conferring three major benefits upon a firm. First, in a turbulent environment, a flexible response to changing situations may be necessary for the basic survival of the business (Drucker 1985). Second, it may enable the organisation to reach an optimal level of internal efficiency by allowing improvements such as BPR (Hammer 1990, Oliver 1993). Third, flexibility of response might give the firm a competitive edge through its ability to develop new performance-enhancing features and to exploit first mover advantages (Porter and Millar 1985). Related concepts include robustness, which refers to a system's ability to absorb or endure the impacts of unpredicted events (Anderson *et al.* 1997) and versatility, which has been defined as a capability to respond to a range of future events or to modify behaviour quickly when change occurs (Bonder 1976).

8.3 Creating Flexible IS/IT Infrastructures

Clearly, the issue of flexibility is important for all types of system, including transaction processing systems (TPS) for economic and operational reasons, but the importance of matching the type of strategy to the nature of the supporting system means that the issue of strategy matching is particularly important to SIS. A fixed, long-term strategy can be supported adequately by a rigid system which has little need to cope with change, but a flexible strategy (i.e. one which seeks to exploit advantage by virtue of change) can only be supported by a flexible IT infrastructure and flexible IS applications. Indeed, there may be evidence that some rigid strategic IS/IT applications have inhibited the ability of organisations to exploit business opportunities by making changes in strategy. As has been pointed out, the literature contains cases of strategic systems that have come to be regarded as classics. These cases, from a number of business sectors in the US, have been described individually and collectively (e.g. Boon 1988) from many perspectives over the past two decades. Although Ciborra (1991) highlights the informality with which some of these classic strategic systems were developed and offers some guidance on activities which may assist, the methods advocated (e.g. *bricolage*, serendipity etc.) are difficult to formalise and hence difficult to use in a systematic way. The need may be, therefore, for a framework that allows the development of strategic systems that have a reasonable life span in which to support the strategy (Avison *et al.* 1995). An examination of some of the classic systems suggests that there are three critical components that should be in place

when an organisation seeks to develop a flexible strategic system. First, there should be methods that can model the firm's intended strategy in terms of its strategic position and vision. This element is provided by the strategic positioning method and the method for supporting strategic vision proposed in Chapters 7 and 9. Second, there should be a framework for defining the flexibility scope or potential for strategic manoeuvre and third, there should be techniques for linking the flexibility framework to the conventional systems analysis and design methods (Table 8.1). Stages 2 and 3 of the process described in the diagram are explored in the remainder of this chapter.

This identifies the framework component (Stage 1) as a descriptive tool (for ideas generation) and the analysis technique (Stage 2) as a prescriptive tool used to filter the strategies or manoeuvres created by the framework into strategic applications supported by the development infrastructure (Stage 3). Although these components are linked, the first and third stages have received more attention in the literature than the second, yet the requirement of flexibility is met most fully at this second stage,

Much of the previous work has focused on frameworks to support "idea generation", but "idea filtration" may be a considerably richer target of investigation. There is an extensive cost-benefit literature and a smaller risk analysis literature, but there is no comprehensive analytical tool for assessing the strategic implications of IT-based competitive-edge projects.
(Feeny and Ives 1990 p. 29)

An examination of planning methodologies which compares two techniques of the competitive analysis variety concludes that,

They improve our awareness of the potential uses of information technology for competitive purposes, help classify existing applications, and allow the evaluation of their strategic potential. Their usefulness in generating new and innovative strategic opportunities has, however, not yet been verified.

(Bergeron *et al.* 1991 p. 91)

The proposed method of developing flexible systems should include a suitable 'Stage 1' framework and should consider the issue of handing over to the infrastructure management processes. However, the main thrust of the method is a Stage 2 framework for generating strategic IS/IT applications that support a flexible strategy (as described in Figure 8.1). There is evidence that the framework which best describes the way in which the strategic opportunities behind some of the classic examples of systems is Porter's ICA framework (Kettinger *et al.* 1994), which has already been used as a part of the strategic positioning method. This suggests that the issue of flexibility leads on naturally from the

strategic positioning exercise and that the two issues are complementary. The IT infrastructure in most of the cases was based on the third-generation technology of the time and were poor at coping with possible changes to the applications they supported, and there were difficulties in changing or adding extra functionality to the software.

Stage:	1	2	3
Purpose	Generate candidate ideas for strategic IS/IT applications	⇒ Analyse strategic opportunities as a portfolio	⇒ Develop IS/IT infrastructure for flexibility
Requirements	Frameworks for supporting strategic vision and strategic position	Framework to support strategic development and deployment	Development of plans to retain IS/IT flexibility
Proposed method	Proposed 'positioning' method (see Chapter 7) and 'vision support' method (see Chapter 8)	Apply framework for supporting flexible strategy	Use technique(s) to develop flexible applications and/or infrastructure

Figure 8.1 Flexible System Development Process (Avison *et al.* 1997)

This is exemplified by the prevalence of adaptive maintenance activities that seek to adjust the software to cope with unforeseen influences. Systems in this way are often rendered obsolete by minor changes in the business processes and therefore lack flexibility in coping with future change (Fitzgerald 1990). There have been various proposed remedies to this problem, including the following:

8.3.1 Abstract Design Methods

The use of development methods that seek to produce system designs based on a broader or more abstract perspective of the system requirements. It is claimed that systems based on data models are more flexible than those based on models of processes or business rules. Methods which seek to include design input from a wide range of stakeholders are said to be more robust, as the stakeholders are often able to forecast future changes. The former category would include techniques of the planning variety such as Information Engineering (Davids 1992), participative systems approaches such as ETHICS (Mumford 1997) and contingency development methods such as Multiview (Avison and Wood-Harper 1995).

8.3.2 Software Engineering Principles

Software engineering uses structured design and programming techniques to produce programs which are written in a modular structure to permit changes to software to be made more easily and to allow new functionality to be added (Sommerville 1995). As well as allowing a greater degree of flexibility, such an approach is said to allow IS applications to be developed more quickly and more economically due to the re-use of modular components (Nierstrasz 1992). Flexible software may be designed with techniques such as abstraction, and data hiding (Kitchenham and Pfleeger 1996), but flexible software is an infrastructural requirement, rather than a way of linking strategy to system development.

8.3.3 Future Proof Technologies

The use of technologies that are inherently flexible and future proof and a flexible approach to hardware acquisition could be based on open systems and industry standards'. Both relational technology and object-oriented technology have been claimed to give inherent flexibility. Graham identifies the key benefits that are usually associated with object technology as re-usability and extendibility (Graham 1991). Object-oriented (OO) systems can be assembled rapidly, and system extensions and changes may be carried out without the need to make major changes to the unaffected parts of the system (Nerson 1992). While there is no doubt that flexible technologies such as OO may be valuable for creating flexible infrastructures, there is nothing inherent in OO development techniques which makes them particularly suitable for linking flexible strategy with IS development.

8.3.4 Rapid Applications Development

The use of rapid applications development (RAD) techniques to allow systems which have become inappropriate or ineffective to be replaced with 'new' systems which can be introduced quickly at minimum cost by using RAD (Martin 1991). This approach may be an option where 'the environment is so volatile and uncertain that development of a flexible information system to meet all likely changes becomes impossible' (Avison *et al.* 1994). While RAD may have its place in a flexible systems development environment and for achieving specific objectives such as reducing an applications backlog, it is likely that its role would be alongside the techniques that would be appropriate to a flexible strategy (Fink 1994). The main problem with all of these techniques is that they deal with the infrastructure, rather than the strategy (Avison *et al.* 1997). This is probably because they are not sufficiently near to the front end of the strategic system development process. The result of exploiting and applying these techniques and technologies to support strategic change would, unless they are used with a flexible strategy framework, result in an unacceptable level of system development activity. The management and implementation

of individual changes may become less traumatic, but the overall scope and scale of change would require an exceptionally high level of commitment in terms of physical and economic resources (Duncan 1995). The techniques are summarised in Figure 8.2, which shows a mapping of the different development techniques onto the life cycle of IS operation and the requirements of each stage.

Stage of Life-cycle	Requirements of Life-cycle Stage	Development Techniques
Systems Study	Abstract perspective Data models; should include stakeholders	e.g. Information Engineering e.g. Multiview e.g. Ethics
Systems Design	Flexible, future-proof technology infrastructure and applications	Open Systems Industry standards Abstraction Software engineering Relational/object-oriented
Systems Development	Rapid systems development	RAD/Prototyping Software re-use

Figure 8.2 Techniques for Developing Flexible IS/IT Infrastructures

Figure 8.3 extends this view to include a succession of implementations of a single strategic application over long time scale. As a part of its SISP process an organisation will seek to produce a succession of systems (A, B and C) which will serve the same application over time (1-6+ years here). Each system has a development phase (during which it operates in the 'loss' sector of the diagram) and a maturity phase, during which it makes gains. The maturity phase ends when the system loses the flexibility to cope with changes in the business application or the technology and is replaced or withdrawn (Gibson and Hammer 1998) or continues to function as a legacy system. Through its IS planning process the firm will seek to keep its successive system developments in a constant state of maturity (i.e. making the greatest long-term gains). In Figure 8.3 the curve for System A shows a typical life cycle of a system. The curve for B shows the effect of more effective analysis or more flexible technology. The development phase is longer and more costly than for A, but the mature phase has greater duration. The idealised curve for System C shows the effect of rapid development methods such as RAD and possibly CASE tools. The all-important lead-time between the firm detecting a decline in the ability of System B to meet the needs of the business (a loss of flexibility)

and the initiation of the development of C is much shorter than with other approaches, as is the development phase. An important side effect of this approach is that the user requirements can be captured much later for C than for the other systems.

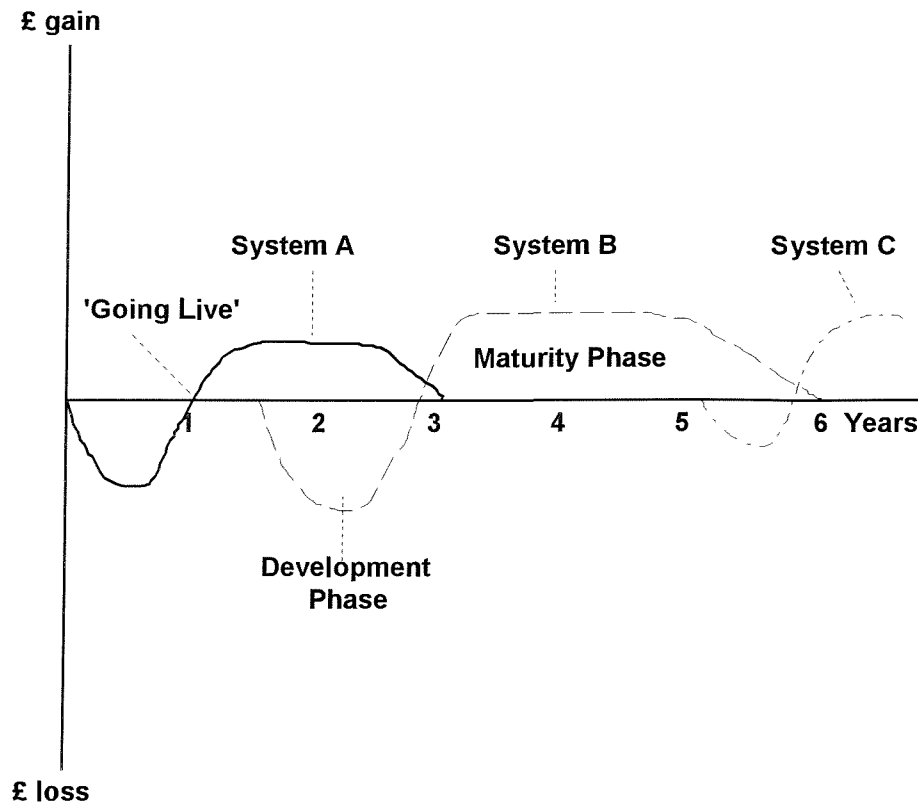


Figure 8.3 Life-cycles of Systems Having Different Approaches to Flexibility

The above approaches might be effective in producing systems and infrastructures which are flexible, but that they contain nothing which addresses the salient problem of linking the nature of the system to the characteristics of the business strategy (Duncan 1995). Therefore, although the systems may be flexible, it is not likely that they could support a flexible business strategy, since they focus on Stage 3 of the process to the detriment of stages 1 and 2.

8.4 A Framework for Developing Flexibility

Evans (1991) identifies two aspects of strategic flexibility, which relate to the temporal and the intentional aspects of strategy. The temporal aspect has two modes: *ex ante* which implies preparing in advance for some unpredictable future change, and *ex post* which involves making adjustments after an event has occurred. The intentional aspect has offensive and defensive modes, according to whether a proactive or reactive stance is

taken. Evans uses these aspects in a framework that defines four archetypal manoeuvres: pre-emptive, protective, corrective and exploitive, as in Figure 8.4.

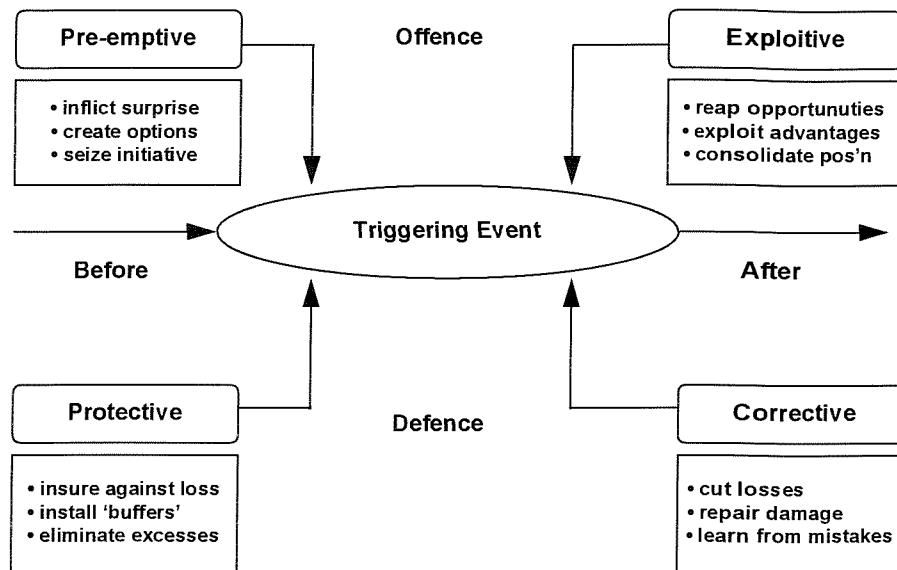


Figure 8.4 Strategic Flexibility Manoeuvres (after Evans 1991)

Although Evans refers to these manoeuvres as strategies, in the view of Silk (1990) they are a means to an end, rather than an end in themselves and are referred to in this chapter as manoeuvres or tactics, which are placed into the following categories:

8.4.1 Pre-emptive Manoeuvres

A pre-emptive manoeuvre is one that puts a firm into a position to take advantage of possible future events (Drucker 1996). This tactic is most valid where the future is particularly unpredictable and where the exploitation of innovation is a tool of competition. Heidegger (1977) describes the actions of firms which 'enframe' new products, distribution channels or business methods can be introduced, implying that a framework or range of options is set up from which a future choice may be made. Rosenhead *et al.* (1986) use the term robustness to describe a strategy of creating and leaving open such options, and draw a contrast between pre-emptive decision-making and conventional situation-based decision-making.

Rosenhead argues that a robust decision is one which has the maximum number of reachable outcomes and discusses a robustness ratio - the potential number of feasible outcomes which may be reached from a decision point compared to the number which

were available before that point. A robust strategy will therefore absorb the effects of changing circumstances and cater for the objectives of the strategy-setter not being fully formulated. Developing a strategy that includes support for pre-emptive manoeuvres implies that action will be taken at some future time. This may be to gain a first mover advantage in developing new methods of work or to respond to initiatives by rivals or new entrants with innovative product/service developments (Eardley *et al.* 1996).

8.4.2 Exploitive Manoeuvres

Whereas pre-emptive tactics are put into effect before an unforeseen triggering episode, 'exploitive' tactics are deployed after the event. Exploitive manoeuvres are intended to capitalise on opportunities that are created by chance or pre-emptive tactics (Evans 1991). A firm's ability to use IS/IT to exploit such opportunities depends on its ability to use its IT skills and to develop the right type of application quickly. Some examples of exploitive manoeuvres using IT have been due to the identification of the opportunity by the business function of the organisation, rather than from plans made by the IT function (Ciborra 1991). This would imply that a rigid plan for IT development could prove to be a limiting factor to a strategy which seeks to deploy exploitive manoeuvres rapidly.

8.4.3 Protective Manoeuvres

This category of tactic, applied in advance of unpredictable events, is a form of contingency planning and seeks to limit the damage caused by unknown future events. Insurance against a strategy being unsuccessful may be afforded by having a choice of options (from the option list developed as part of a pre-emptive tactic) which may be called upon. Evans (1991) includes the installation of buffers (i.e. de-coupling devices, such as inter-process stock) as part of the strategy.

It is significant that many of the strategic applications of IT, such as JIT systems (Gooding 1988), are aimed at supplanting these buffers by improving the firm's use of information. A further aspect of a protective component of strategy would be the barrier to entry that forms an important part of the ICA model (Porter 1980). IT and IS can be used as a barrier to deter potential rivals from entering a market (McFarlan 1984, Earl 1989). It has been argued that, due to the nature of modern technology, these barriers are, at most, temporary. The major problem with attempting to use IT for competitive advantage is that it is easily transferable (Hagmann and McCahon 1993). Nevertheless, the classic cases examined in the literature search show this to be a common application of protective tactics. In a survey of such cases (Kettinger *et al.* 1994) there is consistent evidence of companies using IT to manipulate barriers to entry in their markets.

8.4.4 Corrective Manoeuvres

It is clear that not all manoeuvres will be successful in spite of the application of protective tactics and the creation of a portfolio of optional pre-emptive manoeuvres. The literature has some examples of strategic IS/IT failures, such as the case of Olin Chemicals. This US company attempted to develop a system to lock-in customers by creating switching costs through the provision of an on-line ordering system, much like AHSC and McKesson. Olin's system failed, because it reduced personal customer contact and allowed rivals to set up sales links with Olin's customers (Senn 1992). However, by employing corrective tactics, the company was subsequently able to modify the system in order to stem the losses, repair the damage to its customer base and make good its loss of turnover. Evans describes the case of a manufacturer of industrial controls whose recently developed customised product range failed to sell because of a lack of compatibility with a new industry standard. The manufacturer was able to apply a corrective manoeuvre which involved several parallel tactics, of which the main one was to convert some of the components to conform to the industry standard and sell them at an aggressive discount, undercutting competitors' prices to recover much of the lost market-share. This is a good example of a corrective strategy, but the author does not indicate whether it was planned or *ad hoc*, although the move required a degree of versatility on the part of the firm's management in doing whatever it took to survive which tends to imply the latter. Recovery from the failed exploitive manoeuvre was only possible because the firm had built up 'a considerable amount of goodwill and credibility amongst its own vendors. This example has the hallmark of a flexible response in that it required the juxtaposition of several parallel actions' (Evans 1991 p. 82). Evans' model leads on from and goes beyond the work based on Porter's model as it describes long-term strategic postures (i.e. pre-emptive and protective manoeuvres) which must be in place for reactive or responsive (i.e. exploitive and corrective) manoeuvres to be successful.

8.5 Fuzzy Strategy and Flexibility

It is possible that in some cases strategic flexibility is related to a purposefully imprecise definition of possible future actions in order to allow scope for manoeuvring (Drucker *et al.* 1997). This is called fuzzy strategy (Powell 1995). Evans includes this view in considering alternative manoeuvres that are pre-emptive in nature,

In addition to creating options, there are other ways of being pre-emptive. Policies such as not discussing or pre-announcing new products, or being constructively ambiguous regarding future intentions, are critical elements of pre-emptive manoeuvres.

(Evans 1991 p. 78)

It is not clear whether the author is implying that secrecy or non-commitment is the intended policy. The phrase 'constructively ambiguous' may mean that future intentions are not formulated (in Mintzberg's terms), not that they are simply, as yet, not chosen. In a study of information planning practices with regard to strategic management objectives, the disparity is identified between the need for flexibility on the part of top management when implementing strategic moves on the part of IS developers. 'Top executives preferred flexibility...written plans are more difficult to change' (Lederer and Mendelow 1989). This poses a particular problem for IS planners as they are trying to develop systems and infrastructure to support business manoeuvres and organisational structures which may not even exist in a planned form. Therefore, a paradox exists for the innovative firm that operates in a high-technology environment. Top management will seek to develop strategies that are purposively undefined and prone to rapid and unpredictable change, while those who control the means by which the strategy will be made operational (IS planners and developers) require stability and predictability to support their planning process. This implies a clash between clarity and fuzziness. Fuzziness is a valuable attribute of a flexible strategy for a firm in a state of change (Powell 1994), and a strategy needs to be flexible when the organisation uses IT strategically, as it causes environmental turbulence (Dussauge *et al.* 1992).

8.6 Techniques for Developing Flexibility

Evans' framework seems to be successful at capturing the elements of a flexible strategy and, therefore, the framework may form the basis of a planning process for strategic system development. In support of the framework, methods are needed for analysing the environment, identifying strategic opportunities (i.e. triggering events) and modifying existing applications or developing new systems to meet these opportunities. The practice of strategic system development lacks well-developed Stage 2 techniques for assessing the impact and potential of future IS/IT development that is compatible with Evans' (Stage 1) framework. This section seeks to bring together and evaluate some candidate techniques that have been used or suggested in other contexts or business areas:

8.6.1 Competition Analysis Techniques

Porter's ICA framework and Wiseman's strategic options generator are examples of techniques which seek to identify strategic opportunities and to suggest mechanisms by which IT may be used to support them. Such techniques are, however, subject to problems when used in support of a flexible strategy due to their limited scope.

[Porter's model]..helps executives at the level of the strategic business unit clarify their business strategy and discuss where IT...may yield competitive advantage [and realise] what strategic actions are possible and what

industry reactions are likely [by using] generalisable rules, principles and probabilities governing strategic actions on each force.

(Earl 1989 p. 55)

McFarlan (1984) and Cash and Konsynski (1985) have developed Porter's original model to suggest more specific IT-based mechanisms by which strategic objectives may be achieved without specifically addressing the issue of flexibility. Wiseman (1985) terms such manoeuvres as strategic thrusts and equates strategic targets with Porter's competitive forces in a technique that he calls the strategic options generator (SOG). It is clear, however, that the technique is specific and is aimed at a single objective or target rather than suggesting a range of possible options. The true value of this technique may therefore be in clarifying the firm's business strategy and suggesting the direction of the IT-strategy connection (Earl 1989). There is little to suggest that the technique is compatible with a flexibility framework such as that suggested by Evans.

8.6.2 Impact Analysis Techniques

Parsons (1987) describes the application of the strategic IT mapping technique, which attempts to solve some of the problems inherent in the use of competition analysis frameworks. The technique is a variant of the two-dimensional mapping array used in a number of business applications and is examined in detail in Chapter 7, where it is suggested for use with a competition framework to support a strategic position. The use of the strategic IT map can also be used to show how the use of IT may affect the firm's environment. Strategic IT mapping is included amongst a series of techniques examined by Ward (1988a, 1988b) who states that, '...the various applications can then be managed according to their business impact, rather than their technical peculiarities'.

8.6.3 Applications Portfolio Management Techniques

Management techniques based on portfolio analysis have been traced back to work done on strategy at General Electric in the 1960s (MacMillan 1986), since when they have found a variety of applications with varying degrees of success (Haspeslagh 1982). Parsons likens the management of a portfolio of IS/IT applications to the management of a marketing product portfolio. He points out that strategic IS/IT applications are special cases as 'strategic systems need more nurturing - adept team and resource development, [and] flexible approaches to problems and opportunities' (Parsons 1987 p 250). McFarlan (1984) suggests the use of the strategic grid which combines techniques for identifying opportunities for the strategic application of IT with techniques for managing the IS applications portfolio. The strategic grid goes some way towards overcoming problems of identifying strategic applications and resolves the dilemma created by operational applications having strategic importance (Andreu *et al.* 1991).

The grid therefore enables the issue of the strategic value of IS/IT applications to be viewed with a greater perception of future requirement that has several important implications. First, IS/IT applications have life cycles that follow a similar pattern to those of products and therefore any given application of IS/IT will appear in different places in the matrix during its life cycle (Adolph 1996). Just as it is possible to create marketing opportunities rather than simply respond to them, so it may be possible to make an IS strategic by matching potential IS/IT applications to the flexible strategy framework. Second, the portfolio of IT applications must be considered as a whole, so that strategic benefits may be harvested from current and planned applications and IS/IT developments can complement one another. In the strategic grid technique, existing and potential systems are plotted onto a matrix according to the extent to which the organisation depends on them and their impact on the organisation. The resulting quadrants are labelled factory, support, turnaround and strategic and they are intended to be managed in different ways,

Factory systems need tight control of quality and change to avoid disruption to the business, but an awareness of how the system needs to develop to sustain the business benefit. The strategic and turnaround applications will demand both substantial and high quality resources to make them successful - these must not, therefore, be drained in sustaining factory and support applications, the latter in particular should be researched only when absolutely necessary.

(Ward 1985 p. 248)

Silk (1990) proposes a more developed framework called the benefit-level matrix. This is similar to a number of established matrix-based techniques including the SPACE matrix (Radder and Louw 1998), the business assessment array developed by General Electric (MacMillan 1986) and the directional policy matrix used by Shell Chemicals (Wind and Mahajan 1981). Silk uses the matrix as the main technique in a three-stage method for identifying strategic opportunities and managing the applications portfolio. For the first stage, Silk recommends SWOT analysis (Glaister and Falshaw 1998), although one of the techniques derived from IBM's Business Systems Planning (BSP) or the strategic IT mapping technique for mapping the present would be equally appropriate. For the second and third stages he developed a technique which maps the focus and the benefit of the proposed IT investment portfolio. The benefit-level matrix is a 9-cell refinement of a future strategic IT map (Parsons 1987) as it uses the classic three-level model of information provision (Gorry and Scott Morton 1989) and an axis which distinguishes between systems which are intended to aid efficiency, effectiveness or competitive edge. Silk states that the matrix can be used to 'plot the historical evolution of the use of IT/IS,

and thus to indicate likely future developments' (Silk 1990) by using arrows showing how the dimensions affecting the systems may change.

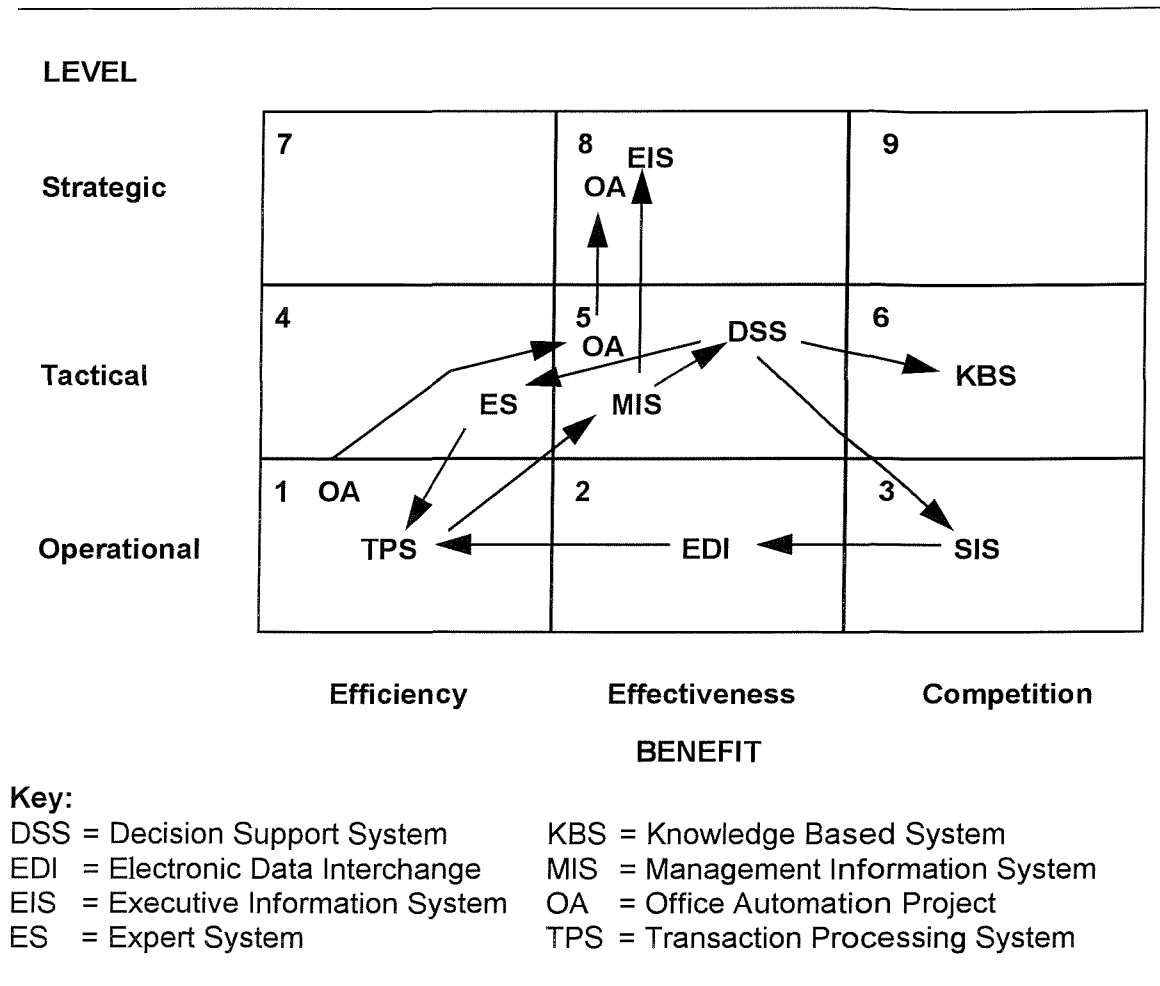


Figure 8.5 The Benefit-level Matrix After Silk (1990)

The benefit-level matrix (Figure 8.5) represents a significant advance on the strategic IT map, because future changes in predicted benefit and level of support can be shown on a single diagram, rather than separately for each future period. It also allows the user to plot the 'movement' of applications over time as with the strategic grid. The benefit-level matrix is therefore potentially more useful than either of the other techniques. Silk uses the matrix to map the development of IS. In the benefit dimension cells 1, 4 and 7 contain systems intended to give operational efficiency, such as basic TPS. Cells 2, 5 and 8 contain systems intended to improve decision-making and management effectiveness, such as decision support systems (DSS). Cells 3, 6 and 9 contain so-called strategic systems that give competitive advantage. Applications cycle around the matrix (shown by arrows) as the importance and benefit of the systems change over time. Significantly, in Silk's example, the strategic IS/IT application is placed in the operational/competitive edge

sector. Although he quotes some of the transaction-based systems which are regarded as classics (such as Sabre, ASAP and Economost) the strategic/competitive edge sector is vacant. It is here that a flexible strategic support system (to take advantage of strategic flexibility) would fit, and there will be strong pressure to seek these new IT/IS applications (Silk 1990). The method is potentially useful for positioning a company's IS/IT strategy at some future period and could also be used to identify IT applications that will allow the company to achieve its objectives in terms of a flexible strategy (Fitzgerald 1988).

8.6.4 Scenario Modelling Techniques

It has been recognised that most IS/IT development methods are concerned with capturing the requirements for the system at the present moment (Avison *et al.* 1996). As the life-cycle of major systems exceeds ten years, as business requirements are bound to change over time and, as effective information systems are likely to cause business change (Powell 1994), this is clearly unsatisfactory. Organisations might spend up to approximately 80% of their IS/IT budget on maintenance, and a large proportion of this might be adaptive in nature, in that it seeks to modify the software to suit a changed business application (Glass 1991). McFarlan (1984) suggests a portfolio management technique that indicates that the bulk of expenditure should be on systems of future potential or strategic worth. With regard to the 80% figure quoted above, most of the emphasis in information systems practice and literature is devoted to the development activities which make up the other 20% of costs (Avison *et al.* 1994). Failure to recognise future system requirements and inflexibility are identified as common reasons for the failure of IS (Glass 1991).

In the light of these problems, several techniques for designing in flexibility have been proposed such as Future Analysis (Land 1982) and flexibility analysis (Fitzgerald 1990). The objective of Future Analysis is prediction of likely and possible scenarios indicating what the information system is supposed to do and for how long. In other words, to produce a range of options as part of a pre-emptive strategy (Evans 1991) to allow robust decisions to be made (Rosenhead 1989) regarding future system developments. Future Analysis has two stages. First an attempt is made to identify changes which may impact on the proposed information system at some future time. These include organisational, technological, economic and legal requirements. There is an obvious correlation here with one dimension of the future strategic IT map (Parsons 1987). Land (1982) recommends that a multi-disciplinary team using simulation, statistical forecasting and economic modelling techniques carries out this stage. More creative techniques such as brainstorming, lateral thinking and Delphi forecasting have also been employed for similar tasks. At the second stage the team seeks to assess the impact which the changes may have on the proposed system in terms of scope and scale. This is broadly analogous to the

horizontal dimension of a strategic IT map (Parsons 1987). The deliverables from the final stage are: a list of design objectives, a set of evaluation criteria and an estimate of the required life cycle for the proposed system. In addition the functions of the IS which are most subject to change are identified, as are future scenarios with which the proposed system may have to cope. Future Analysis would be suitable for generating both types of pre-emptive manoeuvres (Evans 1991) and for producing a future strategic IT map (Parsons 1987) to identify IS/IT applications.

8.7 Analysis of the Candidate Techniques

The choice of a technique to support the strategic positioning component of the proposed strategic linking method (see Section 7.10) was relatively straightforward, and a rational selection could be made by the researcher alone based in information derived from experience and from the literature search. However, it soon became clear that the choice of techniques to support the strategic flexibility component of the method would be more complex, due to the number and range of the techniques that were available for review. Although the researcher was familiar with most of the techniques to some extent, it was not possible to make such a choice based on personal experience, and the literature search did not truly allow a rational comparison of the techniques to be made. Therefore, it was decided to employ the experience of other academics and practitioners to give advice, using a variant of a rating method used by Delone and Maclean (1991). This, in turn, appears to be a simplified variety of the long-established Delphi method (Sackman 1975). This type of selection method relies on achieving a consensus of opinion among experts and, as such, is inherently subjective. However, this property should not detract from its usefulness in this situation, as it suits the interpretivist paradigm upon which this research is based (see Chapter 2). Selections made by the researcher alone would involve subjective choices based on his knowledge and experience. The method, as adapted for this research, simply seeks to make use of the wider knowledge and experience of others. The decision-making process is described in the following section:

8.7.1 The Panel of Experts

The panel of experts was recruited from individuals with relevant teaching and research experience by personal contact and word-of-mouth recommendation. It must be stressed that this is not an attempt to produce a sample population in the same sense as the survey in Chapter 6. The purpose of the exercise is to augment the existing sources of information with the personal experiences of knowledgeable individuals. The main criterion for inclusion was that the individuals should have experience and knowledge of the techniques. This was rated informally in a set of questions that was sent by electronic mail to potential panel members when they were invited to take part. In such an exercise, it is

desirable that a balance is achieved. On the one hand, the panel should be manageably small to ease the process of consensus. On the other hand, a larger panel may guarantee a wider range of experience. In the end, it was decided to proceed with a panel of six (four university lecturers and two practising consultants). The four senior academics are from business schools and are involved teaching strategy or business policy, and the practicing consultants (both from KPMG) work at the interface of business and IT. All the participants were familiar to a greater or lesser extent with the techniques under review. The researcher's role in the process was that of facilitator.

8.7.2 The Comparison Process

The linking techniques to support strategic flexibility are to be based on Evans' framework for defining strategic flexibility (see Section 8.4). Therefore, the criteria on which the comparison of techniques was made are based on the manoeuvres (in the pre-emptive, exploitive, protective and corrective categories) that are described in that framework (see Figure 8.4). It was not necessary for the participants to be familiar with the framework, as they were able to read Evans's paper and any questions were answered in advance by the researcher. A case study that describes the development of flexible IT systems at Roadway Express Inc. (written by a colleague at Staffordshire University) was provided to give a practical application to which the framework could be applied. The participants (contacted by electronic mail) were given a list of the techniques (grouped into categories) and a paper identifying instances of manoeuvres in the pre-emptive, exploitive, protective and corrective categories in the case study. They were then asked to reflect on the extent to which each of the categories of technique on the list would support the manoeuvres.

8.7.3 The Ranking Process

The techniques were then subjected to a comparison using a matrix to score the features or attributes of particular importance. This is a type of Feature Analysis (Law 1988). The techniques are ranked on a scale of 1 to 5, a higher score showing greater potential for the technique to be successful in support of each of the above framework features. A unanimous decision was required to 'rank' a technique. In the case of the experts' judgements not being unanimous, other impartial experts (the researcher's supervisors) were to be called upon to arbitrate. No ties were allowed. As it happened, a remarkable consensus of opinion was obtained in the process. The results of the rating exercise are shown in Figure 8.6, which shows the degree of support that each category of technique was felt to give to each type of manoeuvre imposed upon a matrix in the style of Feature Analysis. More stars indicate a greater degree of support for the category of manoeuvre (e.g. exploitive manoeuvres) by that particular category of technique (e.g. industry competition models).

8.7.4 Selection of the Techniques

The output from the ranking process was a set of recommendations for categories of technique for supporting the respective categories of manoeuvre. Being based on categories, this process gives a general recommendation only. The final choice of a specific technique to form a part of the strategic flexibility components of the proposed strategic linking method was made by the researcher, who selected the most appropriate technique from the category, based on the improved level of knowledge that the comparison exercise had provided.

Support for type of manoeuvre				
Techniques \ Feature	Pre-emptive	Protective	Exploitive	Corrective
Industry competition models (eg. Porter's ICA model & Wiseman's SO generator)	**	****	***	**
Impact analysis models (eg. Parson's strategic IT map & potential IS/IT applications grid)	***	***	**	*
Portfolio analysis models (eg. McFarlan's strategic grid & Silk's benefit / level matrix)	*****	*****	*****	***
Future scenario models (eg. Land's future analysis)	****	**	*****	*****

Figure 8.6 Feature Analysis of Techniques for Developing Flexible Systems

An analysis of the Feature Analysis matrix allows some important conclusions to be drawn from the exercise:

- The competition analysis techniques (e.g. Porter's ICA model and Wiseman's strategic options generator) score moderately well in one category of *pre hoc* strategy - protective manoeuvres. The lower score in terms of pre-emptive manoeuvres arises because these frameworks produce a single outcome, not a 'robust' set of options. This category of techniques does not exhibit strongly the features which are necessary

to put *post hoc* strategies into place, although they can be used to identify opportunities for short-term exploitive manoeuvres;

- The impact analysis techniques are moderately good at generating *pre hoc* strategies due to their use in identifying the impact and importance of IS/IT at a future point in time. They do not possess techniques for putting *post hoc* strategies into place due to their links with a longer-term planning cycle;
- The techniques based on IS applications portfolio management lend themselves to the development of both types of temporal strategy due to their richness and flexibility. They score highly in terms of *pre hoc* strategy because of their ability to develop future scenarios and to generate sets of options that can be chosen from the portfolio in the future. They also score moderately well in terms of *post hoc* strategy, particularly when linked to RAD methods;
- Future Analysis, as the workable representative of the 'scenario modelling' category, scores moderately well in all categories of strategy because of its richness. In particular, the technique lends itself well to both generating a range of future scenarios and putting into place imaginative, short-term corrective and exploitive manoeuvres. This feature is shared with techniques in the problem-solving category such as brainstorming.

The highest-scoring category of analysis techniques is the portfolio management category and the technique from this category is chosen for use with Evans' framework at Stage 2 of the flexibility process is Silk's benefit-level matrix (Silk 1990).

8.8 Summary

The strategic importance of IS/IT applications has been recognised for some time, and successful cases of strategic applications are well documented. It is suggested that the nature of strategy is changing, with the current emphasis being on flexibility or corporate agility rather than a fixed competitive posture. Many existing systems may even be inhibiting the ability of organisations to change to such a strategy. The techniques that are included in the analysis have all been used or suggested for use in a variety of management and IS planning contexts, but they all have their limitations when applied to the analysis of flexible strategy. There is scope, however, for the synthesis of some of the techniques into a method that would use them in combination. Such a method would have some of the features of the contingency approach which has been suggested for IS development (e.g. Avison and Wood-Harper 1992). It is contended in this chapter that conventional SIS development methods do not take strategic flexibility sufficiently into account. Flexible infrastructures and technologies are available but these do not support flexible strategy directly. There is therefore a need for development techniques that incorporate flexibility into strategic systems development to support flexible strategies..

The chapter categorises the techniques and assesses them in terms of a their match with a suitable strategic framework. It then goes on to make a recommendation of one of the techniques. Here, the importance of a flexible technology infrastructure is accepted, but it is suggested that the achievement of flexibility has its place within a more fundamental strategic framework - one in which strategic IS/IT applications give support to flexible business strategy. An examination of the link between the strategy framework and the development of IT infrastructure shows that there are viable techniques from other management disciplines which may be adapted for the development of strategic systems. A feature analysis produces ratings of these techniques and a recommendation. The recommended combination of framework and technique which emerges from this part of the research is important in ensuring that the strategic position(s) which can be achieved by using the method recommended in Chapter 7 are capable of being sustained, at least in the short and medium terms. However, to ensure that the strategic IS/IT applications are consistent in supporting the long-term strategic objectives of the organisation it is necessary to research and recommend a framework to link business vision and strategic IS/IT applications. Thus, strategic vision, the third component of the strategic linkage process identified in the research, is the subject of the next chapter.

Chapter 9

Strategic Vision

The first and second components of the strategic linking process (i.e. strategic positioning and strategic flexibility) were explored in Chapter 7 and Chapter 8 respectively. A strategic IS/IT application that takes these components into account in its development will be effective strategically and will prove to be flexible in coping with foreseeable environmental changes (at least in the short term). However, that to achieve and sustain a long-term strategic advantage it is necessary to build strategic systems that support the organisation's corporate vision. This part of the research therefore begins with an examination of the sustainability of strategic advantage in the business strategies of some of the world's most successful companies in a variety of industry sectors (e.g. Clemons and Row 1991, Clemons and Weber 1990, Hopper 1990). The chapter then goes on to look at the importance of vision in business strategy and to propose an 'envisioning method' that can support the life cycle of the strategic vision process. A series of candidate techniques are evaluated and a composite is proposed for use with the other strategic linking components.

9.1 The Importance of Vision in Strategy

While the long-term success of some of these examples of strategic IS/IT applications has been questioned (e.g. Eardley *et al.* 1996, Avison *et al.* 1996, Senn 1992), there can be little doubt that these systems met the purposes for which they were intended (not necessarily related to strategic intent) at the time they were developed. Clearly, the ability to achieve support for a business strategy through the use of IT and the ability to sustain it in the future need different organisational skills (Feeny and Ives 1990). Equally, the attainment of future strategic objectives implies more than just using IT to compete for a predefined target in a well-understood market with known competitors (Bergeron *et al.* 1991). There is also evidence that the most important strategic applications are those which enable an organisation to form its future relationship with its environment (Liang and Tang 1991). This future orientation sets a different agenda for IS development, 'The challenge for business is to break the rules of the past and structure IS to meet a variety of changing information requirements, some of which cannot even be known before the systems are built' (Allen and Boynton 1991). It is suggested that some strategic system developments fail to take into account these future requirements. The problem is that, in modelling the business processes and structures as they are at present, IS development methods fail to encompass the requirements of the system as it may be or should be at some time in the future (Fitzgerald 1990, 1988). This can have a number of detrimental effects on the organisation. First, the organisation's strategic systems development effort

will be diverted or wasted on efforts to keep up to date through BPR (Andrews and Stalick 1994) or the re-engineering of legacy systems. Second, the strategic IS/IT application will not support the organisation's long-term business strategy as few organisations are able to sustain the piecemeal development effort indefinitely (Ciborra 1991). Third, the competitive advantages from such systems is difficult to sustain (Kettinger *et al.* 1994) and fourth, the organisation's strategic flexibility may be compromised by its inflexible IS/IT applications and infrastructures (Duncan, 1995).

In extreme cases the nature of an organisation's IT infrastructure may be such that major modifications or updates through re-engineering or migration are not feasible, while the technological enhancements which are required to support new strategic requirements are not compatible with the existing legacy systems. In such cases the organisation may be prevented from moving in a desired strategic direction (e.g. the establishment of new business alliances or electronic commerce links) by its existing strategic systems (Eardley *et al.* 1997) such as occurred in the UK financial services industry (Clemons and Weber 1990). This is one effect of a lack of support for the company's vision. Vision has been shown to be an important component of business strategy (Volberda 1996, Wallbank 1994, El-Namaki 1992) and strategic IS/IT applications that do not support this vision may actually impede the achievement of the vision. There are several possible causes of this failure to match strategic IS/IT developments to the business vision. First, the managers of the organisation may not appreciate the role that IS/IT plays in supporting the process of setting, promulgating and 'operationalising' their business vision, and are therefore not seeking to develop strategic systems that will perform this role (Norman 1992). Second, there is a gulf in communication between the managers that does not allow them to communicate the importance of the systems to the organisation's strategy (Lederer and Putnam 1987). Third, the methods that are available to the developers of these systems are not compatible with the vision process and do not contain techniques which allow business vision to be captured in strategic applications (e.g. Norman 1992).

This part of the research therefore examines and defines the concept of vision and relates it to business strategy and strategic systems development. A model of the vision process containing a set of stages (or a life cycle) is then suggested to add structure to and aid understanding of the process. The main property or characteristic of each stage of the process is then identified and a range of candidate techniques is suggested. Techniques may be chosen from this range to develop vision-based IS/IT applications. It will then be possible to match the required properties of the model to these techniques and recommend a combined method that could aid the development of IS/IT applications that support strategic vision. While there are recognised approaches that have some degree of

formality, such as the application of a framework (Avison *et al.* 1996) and feature analysis (Eardley *et al.* 1997), an informal approach is suggested here. In this approach the required properties of the stages are discussed in narrative terms and the techniques are examined and described in more detail.

9.2 The Concept of Vision

The term vision is applied to two types of human activity, both based on the processing of information. First, vision as perception gives an impression of a current situation and, second, vision as prediction forms an image of future events or conditions which relate to a particular context. In the former case, vision is seen as 'the process of discovering from images what is present in the world and where it is' (Marr 1982 p. 5) in which a picture is produced by analysing each component of the image. It is clear that this process goes beyond simply seeing and includes understanding - often a comprehension of some complex situation (Bruce and Green 1992). In order to understand a complex commercial application such as an airline booking system, 'one has to understand a little about what aircraft are and what they do, about geography, time zones, fares, exchange rates, and connections, and something about politics, diets, and the various other aspects of human nature that happen to be relevant' (Marr 1982 p. 5). This implies an understanding of what a situation is now, but the way in which the term vision is usually applied in business is to develop an understanding of what a situation might be or could be at some future time (McGill 1987). In this second case, vision is described as 'a mental perception of the kind of environment an individual or an organisation aspires to create within a broad time horizon for the actualisation of this perception' (El-Namaki 1992). Further, business vision is described as a 'description of something (an organisation, a corporate culture, a business, a technology, an activity) in the future' [my emphasis] (Kotter 1990). Another version of vision is 'a concept for a new and desirable future reality that can be communicated throughout the organisation' (Rowe *et al.* 1994). Vandermerve (1995) argues that, 'a good vision has foresight, is relevant to market needs (now and with a view to the future), and is inspiring - unlocking a picture of what the organisation wants or ought to be like by some future date'. She feels that vision is vital in that it enables the formulation of mission statements and allows executives to decide what courses of action to pursue and, equally importantly, what not to pursue. A corporate vision can also be, 'an image of a desired future state of an organisation ... unlike the traditional strategic planning approaches a vision is: a future to be created, and not a forecast' (Parikh and Neubauer 1993). Norton feels that the term vision is associated with an ability to 'formulate future business direction' and believes that a concentration of interest in the topic among managers is a response to a 'period of cultural and economic instability ...when new courses are being charted' (Norton 1987a).

9.3 The Proposed Vision Process

There are models for describing the vision process, such as the PN Model that refers to reflective, intuitive and integrative visioning (Parikh and Neubauer 1993), Nanus' three-stage visionary leadership process (Nanus 1992) and Callon's (1996) six stage vision-to-action model. Other model processes are more general (e.g. Quigley 1993), but all of these models adopt a business-orientated tactical or planning perspective and with certain exceptions (e.g. Keen 1988) make little reference to IT or the implementation of strategic IS/IT applications. This is curiously at odds with the suggested importance of 'vision support' systems in enacting strategy (Collins and Porras 1994). Building on this work, therefore, a more IS-orientated model is proposed in this research, through which organisations progress in translating their vision into an IT implementation. This proposed six-stage vision process results from the literature search into business strategy (see Chapter 4) augmented by a further search into the properties of vision, which are described further in this chapter. The proposed model recognises both the merits and the shortfalls of the vision models indicated earlier, although it is the creation of the researcher. The model on which the proposed vision process is based was produced by examining the various objectives of developing a business vision, as they are described in the case studies encountered in the literature. These objectives are indicated in Figure 9.2 but, briefly, it is apparent that a business vision usually begins with a creative or intuitive stage, that must be expressed in more concrete terms to allow specific goals to be planned. These three stages may be termed 'gathering the vision' as they involve a reification of the vision. The next stages concern 'spreading the vision' as they involve communicating and promulgating the vision before it can be implemented. The stages of the proposed vision process are termed conception, intention, synthesis, integration and implementation and are described in detail in the following section:

9.3.1 Conception

The act of creating a vision is often attributed to a single individual - often a charismatic leader - who identifies a personal goal or strategic target and who is able to inspire others to respond to the vision by co-ordinating their behaviour in support of the leader's objectives. In the world of politics such individuals are often history makers such as Napoleon, described as '... a visionary, a dreamer of dreams' (Hutt 1972). From the world of business, Vandermervé (1995) describes the experience of Maurice Sahlin as a successful example of a vision setter at SKF's Bearing Division and a similar role has been attributed to Ingvar Kamprad at IKEA (Bartlett and Ghoshal 1994). Other cited examples of vision-setters include General Robert F. McDermott, who recreated the insurance giant USAA through a strategic plan called Vision 2000 and David Whitwam who created a global vision for Whirlpool (Callon 1996). Clearly, for individuals to develop personal 'visions of desired future states' (Parikh and Neubauer 1993) would be

sterile if it were not possible to communicate the vision to others, to inspire or to coerce others to identify with the vision and to commit resources and infrastructures to its achievement. The source of the vision may be a subjective and intuitive experience, as in 'Vision connotes a dream or an apparition...' (Hamel and Prahalad 1994 p. 128) and, 'not something contrary to reason but beyond the province of reason (Parikh and Neubauer 1993). The vision will be abstract and conceptual in nature, and will need translating into terms that are meaningful to the organisation before an IS implementation can be developed to support it.

9.3.2. Interpretation

The problem with interpretation is that the abstract and intuitive qualities of vision are at odds with the precision that is necessary for designing business processes, planning organisational structures and developing IS. Norton (1987a) contrasts the softness of the concept of vision with the hardness of other terms in 'the contemporary management lexicon'. In this context, vision has some of the properties of metaphor. The vision is often represented in a form that is analogous to, or is a representation of, the business situation. The vision-setter him or herself may understand the intention, but this is not the same as being able to communicate that knowledge (i.e. being able to spread the vision) to others. In the past, this difficulty has been overcome by using metaphors (e.g. parables in the field of religious teaching) and functional models (e.g. the Turing Test in the field of artificial intelligence) which are practical instances of the cognitive process in action (Reddy 1979). Vision and meaning are inextricably linked.

In a very real sense, we perceive the abstract relationship between a word and the world. That relationship is meaning and what it relates to is its meaning. Our ability to apply a word appropriately within its relationship to the verbal and non-verbal world defines our understanding of it.

(Horner 1996 p. 127)

This implies that the vision must be rendered in terms that are meaningful to those with an interest in promulgating the vision (i.e. the stakeholders). The word 'meaning' applies in two separate contexts, which can be illustrated by the simple question 'What does the vision mean? [my emphasis]' In the first context, the question implies the need for agreement on the semantics of the vision (Stamper 1987) so that all stakeholders have a shared understanding and in the second, the question suggests that the vision may have an impact on individuals or on the organisation. The question could be interpreted as meaning 'What will be the effect of the vision?' or 'What are the implications of the vision?' (Ogden and Richards 1949). Until the vision can be imbued with meaning in both contexts, it will not be possible to give intention to the vision.

9.3.3 Intention

It is necessary to convert the vision - which is essentially abstract in nature - into a more concrete set of objectives or intentions. Discussions of vision have included the notion of strategic intent - a form of corporate ambition - that is defined as a long-term obsession with the achievement of a particular objective or set of objectives. Strategic intent is described in the cases of Komatsu, Canon and Honda. 'On the one hand strategic intent envisions a desired leadership position and establishes the criterion the organisation will use to chart its progress' (Hamel and Prahalad 1989 p. 64). This approach has been described as a part of a 'currently fashionable prescription' in which 'top management identifies a specific "stretch target" (typically defined in competitive terms) and drives the organisation toward that goal through a series of operating challenges' (Bartlett and Ghoshal 1994). Within the context of strategic intent management must 'seek to lengthen the organisation's attention span. Strategic intent provides consistency to short-term action, while leaving room for reinterpretation as new opportunities emerge' (Hamel and Prahalad 1989 p. 65). The case of Rover Group makes clear the way in which objectives were linked to vision as the car company found it necessary to,

Abandon the rigid strategic planning style of the 1970s, based on the extrapolation of history, invalidated by the discontinuities of the oil crisis and discredited by the 1980s recession... The balance of factors determining competitive advantage were shifting more rapidly... In such an environment, it appeared appropriate to adopt a strategic posture based on a visionary view of the business born out of a semi-conscious feel and understanding of the operations.

(Bertodo 1990 p. 26)

A practical example of intention in the Rover Group is described as 'a series of inspirational statements...brought together by a Core Planning Group...specifically charged with developing, communicating and championing the development of strategic intent for the longer term' (Bertodo 1990 p. 27). Of course, an IS will have many stakeholders, just as a corporate vision may be achieved in many ways. To begin the process of implementing the system it is often necessary to combine the views, requirements or predictions of a number of these key people by a process of synthesis.

9.3.4 Synthesis

Examples indicate that a vision that is a synthesis of the predictions or foresight of many experts is effective in developing a future direction for the organisation. This process of synthesis as a way to 'operationalise' an abstract vision is described at EDS and NEC (Hamel and Prahalad 1994) and IKEA (Bartlett and Ghoshal 1994),

Foresight is based on deep insights into trends in technology, demographics, regulations, and lifestyles, which can be harnessed to rewrite industry rules and create new competitive space. For this reason, industry foresight is a synthesis of many people's' visions.

(Hamel and Prahalad 1994 p. 128).

Instances of synthetic methods for combining disparate views and opinions appear in fields of operational research with the Delphi technique (Charette 1989). A similar approach exists in systems analysis with parts of Soft Systems Method (Checkland 1988) and Multiview (Avison and Wood-Harper 1995), in which a common or root definition of the system is produced. Beyond this, it is necessary for the vision to be embedded or integrated into the organisation's value culture so that it becomes second nature to the personnel and permeates their activities in pursuing the strategy.

9.3.5 Integration

An organisation's value culture may be said to represent an implicit vision - a tacit agreement or consensus view of what the organisation is about and the direction in which it is moving. In a period of stability, the factors which promote this culture will become 'embedded' in the organisational relationships and channels of communication and may bypass the formal IS completely, relying instead on more informal ways of sharing information about goals and values. Norton (1987a) points out that in a period of low environmental change an organisation will rely on its culture or established value-system as a guiding force to its strategy. He implies that this practice involves looking back to some organisational behaviour that enabled past successes as a guide to future actions. Strategies in a period of change, however, seem to require the development of an explicit statement of direction which will guide the search for a new set of values which will achieve success under a different set of circumstances (Reynolds 1987). In these circumstances an organisation's strategists will be responsible for the vital task of sharing the strategic vision upon which this set of values is based (Quigley 1993), and the IS will then be needed to communicate this vision throughout the organisation. While this may be done implicitly or 'informally' through meetings, bulletins and personal communications it has been suggested that a rapidly changing business environment requires a rapid response. New technology upon which modern IS/IT application are based (such as corporate intranets) may be more effective at disseminating such soft information than the informal IS which exists in many organisations. This process is illustrated in the case of Rover, which survived a period of intense change and restructuring and emerged with a new visionary strategy which involved adopting new cultural values based on 'the Japanese-inspired concept of "customer perceived values" [then] beginning to permeate the industry's thinking' (Bertodo 1990). These values probably resulted from its close association with its Japanese partner, Honda, and the change in culture was termed

‘Roverisation’ to express the idea of a drive towards a new corporate culture (Schill *et al.* 1994). The process is described as ‘a series of inspirational statements...brought together by a Core Planning Group...specifically charged with...communicating and championing the development...’ (Bertodo 1990). An ‘integrational’ method known as Master Planning is described as ‘...a route map...a bridge between vision and action’ (Wallbank 1994) and in the PN model ‘The result of this step is creation of the vision finally to be shared and followed by the whole organisation’ (Parikh and Neubauer 1993).

9.3.6 Implementation

The strategic vision may be put into practice in several ways. The first way is to base the firm’s IT infrastructure and IS applications on technologies which are sufficiently robust and flexible to cope with the changes in business operations and culture as the organisation evolves to meet its strategic goals (Eardley *et al.* 1997). This will allow the vision to be achieved (i.e. the technology will not inhibit the strategy) but will not necessarily assist in bringing about the conditions which the visionary strategy conceives. The second way is to design strategic systems to support the business processes and organisational structures that are described by the interpreted vision (Bertodo 1991). Strategic visions are therefore implemented or made to happen by the design and subsequent operation of IS/IT applications that are specifically intended to support the strategy. Norton also points out that ‘for the foreseeable future change will be constant’ and cites the example of the automobile industry in which competitive forces have reduced the design cycle (i.e. the time to market) which rendered obsolete a part of the Ford motor company’s strategic plan (Norton 1990). The situation is complex, as the strategic use of IT causes change (Powell 1994) and the business environment is affected by ‘coincident waves of [IT] developments which tend to drive business innovation in competitors and partners’ (Mui 1992).

9.4 Relating Vision to Systems Development

The difference between the two versions of vision is striking when related to systems development methods. The first definition (perception) relates closely to the way in which conventional systems development methods are intended to operate. The aim is to identify and to understand a current situation by revealing its attributes progressively at increasing levels of detail and to communicate this understanding to others (Langelier 1992). This approach would be characterised by most development methods that feature functional decomposition (Avison and Fitzgerald 1995). These approaches characterise of most systems analysis and design methods, in that the techniques seek to model these processes in terms of existing attributes and values (e.g. data, processes and events) which describe its current state. Such methods do not capture the business requirements as they should be in the future (Fitzgerald 1990).

9.5 Requirements of the Strategic Vision Process.

At first examination, most current information systems development (ISD) methods appear not to offer much support to the developers of vision-based strategic systems (e.g. Avison and Wood-Harper 1991), leaving the field open to intuition or chance. There are, however, techniques or methods from this and other disciplines (e.g. operational research and problem solving) that may have the potential to support the proposed vision process.

Category/Technique	Description/Features
<u><i>Creative Design</i></u>	
'Blue sky'/brainstorm (Wack 1985)	Creative 'ideas generation', unstructured stimulation of the imagination. Internal or external focus.
'Lateral thinking' (Buzan 1985)	'Ideas generation' based on alternative modes of thought. Internal or external focus.
<u><i>Business Analysis</i></u>	
SWOT/TOWS (Glaister <i>et al.</i> 1999)	Environmental scanning, mixture of internal/external, current/future orientation, identifies future moves.
PEST analysis (Robson 1997)	Environmental scanning, current/future orientation, identifies future potential.
ICA Model (Porter 1985)	Positioning framework, current/future orientation, models/ predicts industry behaviour in response to known forces.
CSF Analysis (Jenster 1987)	Internal, current analysis of critical success factors to achieving planned strategy.
<u><i>Problem-solving</i></u>	
NORMA (Stamper 1987)	Semantic analysis, derives meaning from literature or narrative of current/historical situation.
Soft Systems Method (Checkland 1988)	Problem definition/problem solving method based on current, internal/external factors and relationships.
<u><i>Operational Research</i></u>	
Delphi technique (Watson and Beude 1988)	Predictive technique based on consensus of experts produced by synthesis of opinions, internal or external.
SODA (Eden <i>et al</i> 1987)	Future-oriented, external focus, based on consensus using cognitive mapping technique, computer supported.
<u><i>IS Development Methods</i></u>	
ETHICS (Mumford and Weir 1979)	Participative method, based on guided consensus. Internal/current orientation.
Future Analysis (Land 1992)	Environmental analysis method based on future system requirements. Internal/external focus.
Information Engineering (Martin 1989)	ISD method based on future business strategy planning and current business analysis/system requirements.
SSADM (Eva 1992)	Structured ISD method, internal focus, limited future orientation or participation.

Figure 9.1 Categories and Description of Candidate Methods

There are 'an almost indigestible number of strategic planning tools' (Robson 1997) that may be suitable for use in this context. A number of surveys have examined, compared or

categorised such techniques in a variety of contexts (e.g. Bergeron *et al.* 1991, Robson 1997) and other work has suggested a frameworks for assessing or selecting techniques (e.g. Galliers 1992). Based on this work, a shortlist of candidate techniques is examined (see Figure 9.1).

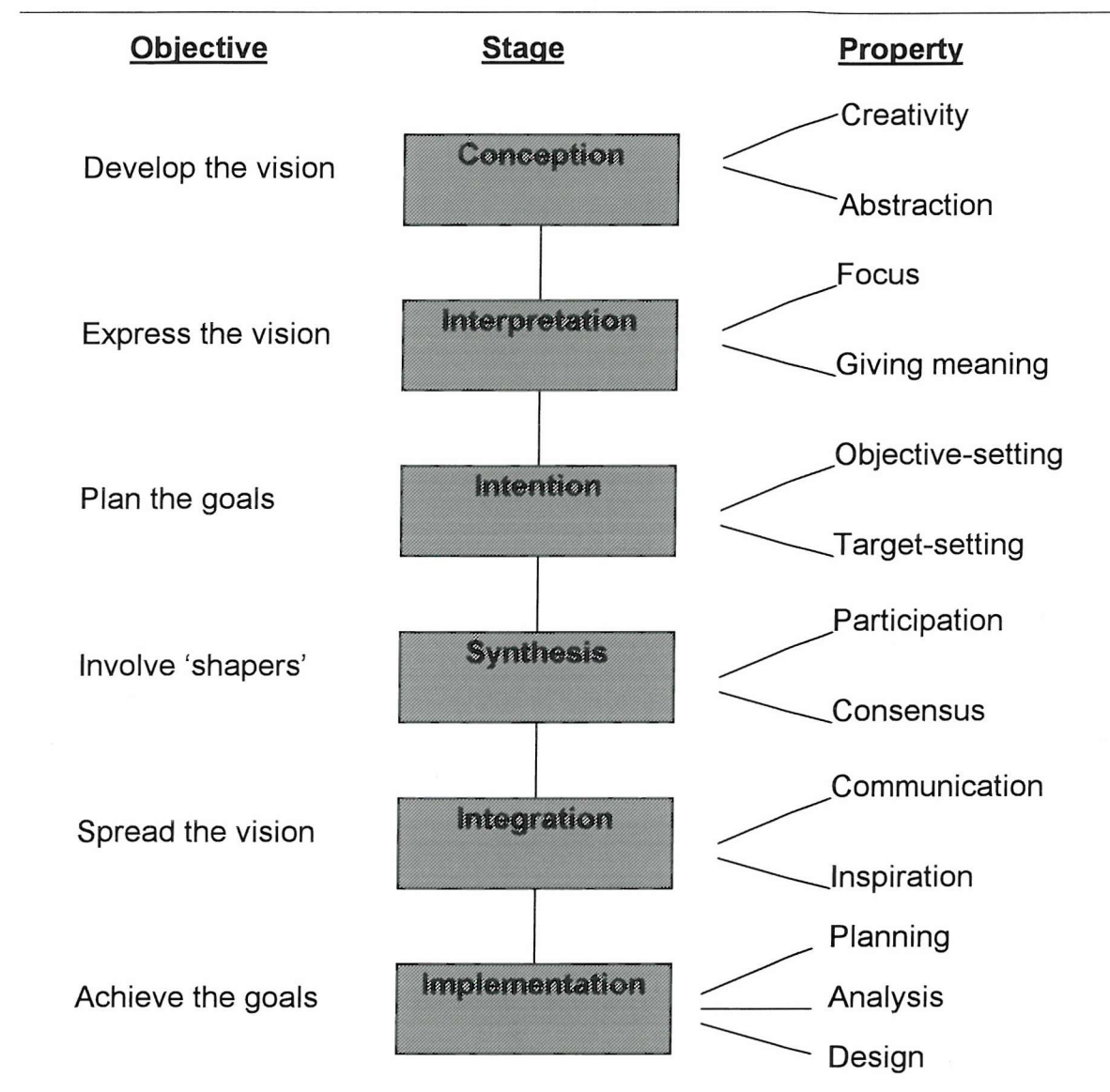


Figure 9.2 The Objectives and Properties of the Vision Process

In the following section an approach is proposed (Avison *et al.* 1998) that is intended to make operational the vision process described in Section 9.4. The stages of the proposed vision process that are derived from the literature search are examined in terms of the properties that the techniques would need to possess (see Figure 9.2). The techniques are then examined for their suitability at each stage. As with the strategic flexibility component described in the previous chapter, it was apparent that the researcher alone

was not able to compare and select the techniques. Therefore, it was decided to use a similar process in this exercise to that which was used in selecting the strategic flexibility component (see Section 8.7). The same panel of experts was asked to compare and to rate the 'vision' support techniques using the same feature analysis process. However, where the criteria for comparison of the categories of technique in Section 8.7 were based on Evans's flexibility framework, in this case the basis of comparison is the proposed six-stage vision support process, as is described in the following section. There was one other variation from the previous comparison exercise, based on the experience gained. As several members of the panel had indicated that the case study had not been particularly valuable to the exercise, it was not used to compare the vision support techniques. The participants were asked to assess the candidate techniques (see Figure 9.1) subjectively for their ability to support the stages (e.g. conception, interpretation etc.) in terms of the extent to which they possess the required properties (e.g. creativity, abstraction etc.). These properties are identified in Figure 9.2. The scoring and arbitration processes in this exercise are just the same as in the assessment of the techniques to support strategic flexibility. As with the previous exercise, it must be stressed that it is not intended to carry out a survey in the positivist tradition. Rather, the objective of the exercise is to glean the knowledge and opinions of experts and to correlate the results in a way that is efficient in terms of the researcher's time and effort.

9.5.1 Conception

To conceive a strategic vision implies a creative, generative mental process, probably with a high degree of originality and with relatively little formality or routine. At the stage of conception visions can exist as abstract ideas or revelations which owe as much to the imagination as to the intellect. Encouraging this originality and creativity is an important aspect of the production of sustainable competitive advantage and will therefore involve a strong element of prediction. It is often 'creative visions ... that provide a longer term view of what customers and end users really aspire, that hold the key to the industries of tomorrow' (El-Namaki 1992). Although there is no direct link between this stage and the development of a strategic IS/IT application, any innovation or competitive advantage will depend upon this conceived vision and therefore, indirectly, it is this vision that the strategic system is intended to support. In this research it is proposed that the requirements of the conception stage of the vision process are to encourage creativity, to provide a degree of abstraction and to allow a future state to be predicted. These requirements are described in more detail in the following section, with an indication of some of the potential techniques that could support this stage of the process:

- **Creativity** - there are several potential techniques from the creative design area such as blue-sky thinking and brainstorming (Wack 1985) which are free-form ways of inspiring creative thinking and original ideas, and interactive nets, which is a method of

combining the ideas or requirements of a key group. A possible drawback of this method is that it is group based, whereas the conception of vision is often an individual process;

- **Abstraction** - several techniques from the business area such as SWOT analysis (Glaister and Falshaw 1999), its variant TOWS analysis (Weihrich 1982) and PEST analysis are probably sufficiently abstract in nature to be used at the conception stage. As they involve an analysis of the business environment, they could prove to be of use in framing a business vision. Such techniques have the advantage of being well-known and well-recognised in the strategy domain;
- **Prediction** - failure to recognise the future requirements and inflexibility have been identified as common reasons for the failure of information systems (e.g. Davis 1990, Glass 1991). A number of long-established forecasting, modelling and operational research techniques would be suitable for providing vision-setters with predictions and some can produce future scenarios that are sufficiently abstract (Chandler and Cockle 1982), but the extent to which they are truly creative is open to question. The business analysis techniques (SWOT and PEST) are at least partially predictive, while the IS development methods are noticeably weak in this area, as they tend to concentrate on detailed analysis and modelling of the current internal system. One IS development technique which has been suggested for use in this area is Future Analysis (Land 1982). The objective of Future Analysis is 'a prediction of likely and possible scenarios... what the information system is supposed to do and for how long' (Avison *et al.* 1995). Future Analysis has two stages. At the first stage an attempt is made to identify changes which may affect the proposed information system at some future time. These will include organisational changes as well as changes in technology and economic and legal requirements. Some creative design techniques such as brainstorming and lateral thinking (Avison *et al.* 1994) may also be suitable for supporting the Future Analysis approach.

9.5.2 Interpretation

The problem with interpretation is that the abstract and intuitive qualities of vision are at odds with the precision that is necessary for designing business processes, planning organisational structures and for analysing, specifying and designing IS/IT applications. The suggested requirements or properties of this stage of the proposed vision process are intended to derive a more concrete meaning from the created vision, and are described in more detail, with some of the techniques that are identified as possible for supporting them, in the following section:

- **Focus** - the problem-solving area of the operational research field offers the SODA technique based on cognitive mapping (Eden and Ackerman 1987) and the Strategic Choice Approach (Friend and Hickling 1987) which could assist in interpreting the

vision by narrowing-down the range of possible meanings. In addition, the second stage of Future Analysis takes a similar approach by seeking to focus upon the impact which the changes will have upon the proposed system in terms of scope and scale, thereby assessing the effects, impact or implications of the vision. Other criteria have been suggested for simplifying complex systems by reducing them to more understandable or acceptable terms, perhaps through the use of metaphors (Flood and Jackson 1991). Future Analysis also has potential to achieve focus through its use in creating alternative scenarios as a basis for discussion;

- **Giving Meaning** - once the abstraction of the originally-conceived vision has been made concrete, it is necessary to examine in detail and give meaning to the focused vision and to remove and prevent 'misunderstandings, failures to discriminate, unnoticed ambiguities, [and] confusion of names' (Stamper 1987). This is a province of the discipline of semantics, 'the translation of one formal representation to another with a reservation of meaning' (Stamper 1987). Several semantic analysis techniques have been applied in specific areas such as Parliament and the law (Stamper 1985) and attempts have been made to produce general axioms of meaning based on predicate logic (Sergot *et al.* 1986) and a semantic theory based on norms and affordances (Stamper 1993). None of the candidate techniques are particularly well equipped to operate in this area.

9.5.3 Intention

The 'intention' stage of visionary strategy focuses the interpretation of the abstract vision onto achievable, measurable objectives and to begin to define targets and levels of performance. Ultimately the effectiveness of the strategic IS/IT implementation will be measured against the targets and measures of performance that are involved in this stage. The proposed properties of the stage are intended to enact the activity of goal-setting as a part of linking the business vision to the strategic systems development process, and are described in the following section:

- **Objective setting** - the portfolio of business methods contains a number of techniques that could be used for setting business objectives to match the vision such as the Strategic Options Generator (Wiseman 1985). The ICA model (Porter 1980, Porter and Millar 1985) is the most well used and reported of such techniques in the area of strategic systems (Boon 1988);
- **Target setting** - the business category includes the well-established technique called critical success factor (CSF) analysis (Jenster 1987) and the strategic vector technique (Norton 1987b). Both of these techniques are capable of being used for setting strategic or tactical targets, and the Industry Competition Analysis model (Porter 1980) and the Strategic Options Generator (Wiseman 1985) have also been used for this purpose in a variety of contexts (Callon 1996).

9.5.4 Synthesis

This is the stage of the vision process at which the contributions of the various participants and the various strategic options that have been identified at the previous stage are synthesised into a single corporate ambition. The synthesis stage therefore is in some ways analogous to the systems analysis phase of human-centred systems design methods and, it is suggested, would be supported most effectively by a technique that encourages the following properties:

- **Participation** - many of the techniques from the different categories are participative in nature, in that they involve teamwork or discussion. Some techniques from the ISD category, however, are particularly noteworthy in this respect. Indeed, a separate sub-category of such techniques has been identified (Iivari 1991) which are based on the socio-technical approach. The first stages of ETHICS (Mumford and Weir 1979) are based solidly on user participation in respect of IS design, and the soft systems method (SSM) has been used to encourage participation in problem analysis (Checkland and Scholes 1990);
- **Consensus** - there are a number of techniques which could be used which are intended to arrive at an agreement or consensus amongst the stakeholders in the vision process. SSM identifies a technique called root definition which seeks to guide the participants towards an agreement of the system goals (Mingers 1990) and the Delphi technique has been used to produce consensus in plans and surveys (Charette 1989).

9.5.5 Integration

The integration stage involves communicating the agreed values throughout the organisation and having them accepted as the cultural norm that guides the behaviour of individuals. It is therefore suggested that the integration stage of the proposed vision process will need to have the following properties:

- **Communication** - arguably, several of the techniques that are suggested for use in other stages of the vision process include aids to communication, as their results usually have to be conveyed to participants and stakeholders. However, whether these techniques would be suitable for communicating the values of the vision throughout an organisation is open to doubt. The requirements are different from those at the participation stage, but the best candidate from the problem-solving category is SSM (Checkland 1988), although the support would be at best indirect;
- **Inspiration** - inspiring the participants to accept and follow the vision is obviously an important element of the vision process, but support is noticeably absent from among the candidate techniques, although some of the techniques from the team building area could be worthy of investigation in this context (Belbin 1996).

9.5.6 Implementation

Strategic systems are implemented in much the same way as other categories of system. It could be argued that the only significant difference is that the 'coverage' of the strategic systems development method must extend further forward than the normal systems development lifecycle (SDLC) and must contain business analysis techniques. A systems development method in this category should seek to develop a system for the future, that is, the system would be designed as it should be, not as it exists presently. Either the design would be sufficiently abstract to absorb the predicted changes in the business processes, or it would predict the dynamic of the business processes in the future. In the proposed vision process, it is suggested that the implementation stage should be capable of supporting planning, analysis and design activities. These properties, and some of the techniques that are identified as possible for supporting them, are described in the following section:

- **Planning** - the SIS planning element has been researched and described regularly (e.g. Galliers 1988) and is undoubtedly of considerable importance when related to vision. However, most systems development methods are limited in their coverage of the front end of the SDLC and focus on the technical environment rather than the business environment. One exception is Information Engineering (Martin 1989) which, it is claimed, 'bring[s] the business and its inherent underlying structures into the process of information systems development' (Davids 1992) by including phases called Information Strategy Planning (ISP) and Business Area Analysis (BAA), the aims of which include,

To link an organisation's mission, objectives, and the critical success factors it recognises for achieving them to an Information Strategy that supports the organisation in realising its goals...To propose Systems Design Projects that relate potential system solutions to the organisation's mission, objectives and main critical success factors.

(Davids 1992 p. 13)

The method seeks to achieve this by taking an architectural approach based on an IS plan which 'flows out of and is closely aligned with the organisation's Business Plan...' (Davids 1992) and a series of Business Models which are produced by Current Systems Analysis. These architectures and models are based largely on normal analysis and design techniques such as entity-relationship models, data flow diagrams and a variety of referential matrices. As these techniques are basically those which are used in less business orientated methods, the implication is that the IE approach may be forward-looking, but that the techniques do not support the forward-looking approach any better than would a method of current requirements analysis (e.g. Vitalari 1992). Of the techniques in the business category, the ICA model (Porter and Millar 1985)

appears to offer the most direct support for this element of the vision process as it seeks to identify strategic opportunities for the use of IS/IT;

- **Analysis** - it has been noted that the term analysis is usually applied to the version of vision which relates to perception in that it is usually assumed that a current system exists and that it will form the basis of any future system design. However, a number of conventional systems analysis and design methods include techniques that have a limited ability to produce designs for future systems. Some methods of the structured school include models of the future such as the systems options (business and technical) in SSADM (Eva 1992). However, these predictive models are no more abstract than other forms of system model and there is nothing else to suggest that these options are linked to the business vision. It may be that a predictive analysis method needs to model different factors than a perception method. One possibility is for the model to examine the potential impact of the future system;
- **Design** - Future Analysis (Land 1992) is definitely forward-looking, but the technique is not intended to form the basis of a system design. It therefore has some things in common with methods of system planning rather than with predictive design, and does not contain the necessary techniques to create a future system model. By comparison, SSADM (or many of the conventional IS development methods) would be capable of producing an effective system design once the future requirements had been captured during the analysis phase.

As a result of the comparison of the techniques carried out by the panel of experts, it is apparent that no single technique has the potential to cover the whole of the vision process. There are, however, a number of techniques that have the potential to support each of the stages. In a similar manner to the assessment of the strategic flexibility component (see Section 8.7) the panel was asked to identify three levels of fit between the factors. These levels were categorised as weak, medium and strong, according to the suitability of the technique (or a part of the technique) for supporting the relevant stage of the vision process (see Figure 9.3). Significantly, none of the stages was unsupported to some degree. Most importantly, instances of the strong category of fit occur throughout the lifecycle, meaning that a range of techniques could give support over the whole vision process. As with the strategic flexibility component, the final choice of technique was made by the researcher, in all cases choosing the instances of the strongest fit for inclusion in the strategic linking component to support strategic vision.

9.6 The Proposed Method for Supporting the Vision Process

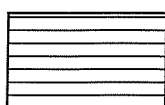
The selected techniques are incorporated into a method for supporting the vision component of the strategic linking process. This is described in the following section:

9.6.1 Conception

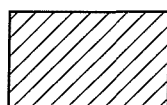
Prediction is the most important attribute of the conception stage, and is linked closely to the properties of creativity and abstraction. Four quite diverse techniques are identified to cover the conception stage. Future Analysis is the most applicable because it offers a measure of abstraction and has innate creative qualities, while SWOT/PEST analysis has some potential but the brainstorming techniques, SODA and the strategic choice approach offer weak support. It is obviously impractical to use all of these techniques at this stage, so a choice was made to use Future Analysis as being most applicable to the main properties of the stage as a whole.

Technique \ Stage	Conception	Interpretat'n	Intention	Synthesis	Integration	Implement'n
'Blue sky' / Brainstorming	WEAK					
SWOT/PEST Analysis	MEDIUM					
Future Analysis	STRONG					
SODA / SCA	WEAK	STRONG				
NORMA		WEAK	WEAK			
ICA / SOG		WEAK	STRONG	MEDIUM		
CSF Analysis			MEDIUM	MEDIUM		
ETHICS			WEAK	MEDIUM		
SSM			MEDIUM	STRONG	STRONG	
IE / SSADM						STRONG

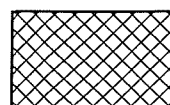
Key to estimated coverage of vision process:



WEAK
little
potential



MEDIUM
some
potential



STRONG
good
potential

Figure 9.3

Estimated Coverage of the Proposed Vision Process

9.6.2 Interpretation

The emphasis at this stage is on the property of focus, as it is necessary to render the abstract vision in terms that are sufficiently concrete to allow it to be operationalised in the later stages. The SODA technique and the strategic choice approach were mostly strongly applicable to the stage, but are complex and time-consuming and may in fact be regarded as being methods in their own right. Of the other techniques, Future Analysis provided medium coverage of the stage and NORMA offered little potential. A compromise was made in the interests of practicality, with Future Analysis being chosen as the technique to support the interpretation stage because it is already in place in the proposed composite method as the main technique to support the conception stage.

9.6.3 Intention

This stage is very business orientated, stressing the importance of objective- and target-setting, so it is not surprising that the candidate technique which best supports the stage is the ICA model, followed by another common business technique, the CSF technique, which gives a medium level of coverage. Surprisingly, perhaps, the SSM method (Checkland and Scholes 1990) had features which caused it to be rated at the same level (the other ISD method, ETHICS is rated as providing only weak support). Since SSM is the chosen method for the next two stages (synthesis and integration) it is obviously worthy of consideration for use at this stage on grounds of practicality alone. However, the ICA model was considered to be more suited to the intention stage and was therefore chosen for use.

9.6.4 Synthesis

The candidate techniques that perform best in this stage are those that are the most 'human centred'. SSM was given the highest rating for coverage of the stage at the first rating, with ETHICS offering some potential. The techniques from the business category (ICA and CSF analysis) achieved a weak score, lacking the necessary combinatorial attributes. SSM was therefore examined in more detail with a view to employing it to support this component of the linking process. It was found that SSM is a rich and complex method containing seven stages that are intended to address specific issues in 'the real world' and in 'systems thinking about the real world'. The full method is based on 'a stream of logic based enquiry' (Checkland 1985) and is often used to describe a problem situation and to initiate organisational learning about that situation,

Activating in the people involved...a learning cycle which is ideally never-ending. The learning takes place through the iterative process of using systems concepts to reflect upon and debate perceptions of the

real world, taking action in the real world and again reflecting on the happenings using [soft] systems concepts.

(von Bulow 1989)

This appears to have some similarities with the application under consideration in this case and seems, at first sight, to offer potential. However, the experience of some of the researcher's advisors suggests that the iterative nature of the method and the rich set of techniques with which SSM is imbued (compared to many of the other methods under consideration) make it too complex for use in this application. A decision was therefore made to use some of the techniques that the method contains, rather than the full method and process. There is an existing example of the successful use of selected techniques being taken from SSM in the Multiview methodology (Avison and Wood-Harper 1995). The techniques that are felt to be workable in the vision-support application are;

- A rich picture, which is an informal pictorial technique for describing or modelling a real-world situation that is noted for 'expressing relationships and value judgements, finding symbols to convey the correct 'feel' of the situation...They express in a condensed way relationships which would require much prose to expound' (Checkland and Scholes 1990). This technique identifies and represents the various participants in a situation (e.g. a business vision) and expresses their relationships. As such it gathers information for the process of synthesis;
- The use of CATWOE criteria, which is a mnemonic technique for describing the various factors and participants (e.g. clients, actors and owners) that influence and impinge upon the transformation process that makes up the situation under study. This technique synthesises the information from the rich picture and can provide input to a suitable technique for drawing these factors together.

Both the rich picture and CATWOE criteria are usually produced by gathering together the important stakeholders in the process and encouraging participative and informal discussions under the guidance of a facilitator.

A rich picture is a pictorial caricature of an organisation and is an invaluable tool for helping to explain what an organisation is 'about'.

(Avison and Wood-Harper 1990)

The two techniques are selected for use in synthesising the business vision and describing it in terms that can be integrated and communicated. This is the subject of the next stage.

9.6.5 Integration

The requirements of this stage are based on the need to communicate the business vision within the organisation. None of the candidate techniques fit this requirement closely, but the root definition technique from SSM provides a suitable vehicle for communication to

take place, as it is naturally integrative. It is therefore chosen for inclusion in the proposed linking method. A root definition is developed from the CATWOE criteria, and constitutes a commonly agreed or consensus statement of the situation (e.g. the business vision). Once the vision had been integrated and expressed, it can be implemented.

9.6.6 Implementation

As this stage is based on a conventional system development process, it is natural that a number of system development methods could offer strong coverage of the stage. As a typical IS development method, SSADM will support the analysis and design properties of the stage well, but IE also offers significant strength in supporting the IS/IT planning process and for this reason is recommended for implementing strategic IS/IT applications (Prior 1991). There are other potential problems with the mixing of techniques. Research work on the epistemological differences between combined techniques of systems analysis and design (Sawyer 1991) and methods for combining techniques from different systems paradigms (Miles 1992) has identified the problems of such combinations and the dangers of such paradigm shifts (e.g. Doyle and Wood 1991a, Doyle and Wood 1991b).

9.7 Summary

The work described in this chapter has allowed certain conclusions to be drawn. Incorporating vision into an organisation's business strategy is an important part of the strategic process, and many examples of success are attributed to this fact in the literature. The turbulence and complexity of the modern business environment, and the impact which strategic system are capable of having on enterprises means that there is a need for a method of incorporating a long-term vision of the future into the IS/IT development process. It is suggested that the process of developing and implementing a business vision follows a life cycle that contains certain regular stages. These stages can be supported by development methods in a way that allows an IS/IT application to be developed that supports the business strategy. Although it is recognised that the combination of techniques from different paradigms poses considerable practical difficulties, there is evidence to demonstrate the potential of the approach, particularly when used as a part of a framework that combines a number of the components of business strategy. Alignment between strategies and infrastructures is an important component of the linkage between business strategy and the development of strategic IS/IT developments (Coleman *et al.* 1996), and therefore this fourth component is examined in the next chapter.

Chapter 10

Strategic Alignment

The ability of an organisation to produce functional strategies that are aligned with one another is another important element of strategy that is identified in the literature search. Cohesion between these strategies has been identified as a crucial factor in using IT strategically (Henderson and Venkatraman 1994). This chapter opens by defining the concept of alignment and examining the linking relationships that constitute alignment in a typical business domain. The chapter moves on to examine the importance of alignment to business performance and to categorise the benefits which successful alignment may bring. The thrust of this part of the research is to categorise the main models of strategic alignment. These frameworks or techniques are analysed as candidates for supporting this part of the proposed framework for linking business strategy and strategic IS/IT developments. A suitable technique is then selected for inclusion in the proposed method.

10.1 The Concept of Alignment

Alignment in a socio-technical system (e.g. a business) is said to occur when the processes and infrastructures support each other and work together harmoniously to accomplish a common end. 'Alignment has the basic property that those things in a state of alignment combine effortlessly as though they were one' (Boar 1994). According to Boar there are degrees of alignment, and the opposite state to perfect alignment is the state of chaos (see Figure 10.1).

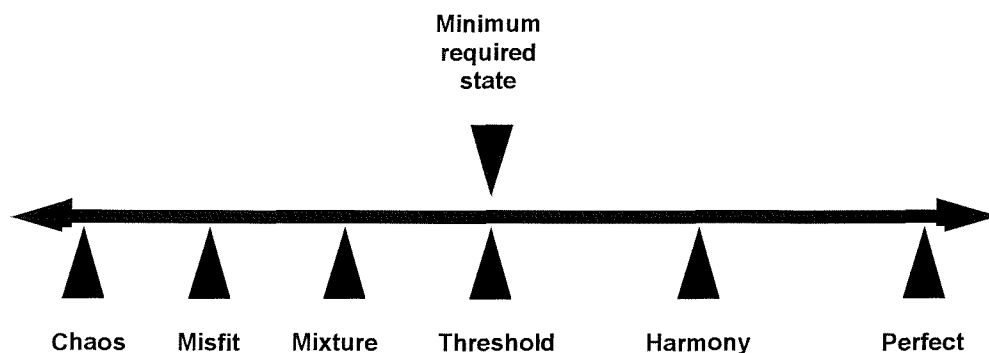


Figure 10.1 **Graduated States of Alignment** (after Boar 1994)

Chaos implies a gross level of misalignment in which responses are unpredictable and it is impossible to achieve effective co-ordination of the component parts of the system. A misfit state is less serious but in this condition efficiency of operation will be low and

manoeuvres will be difficult to initiate. The mixed category describes a situation in which harmony between functions or processes is achieved accidentally. A true state of harmony implies that there is collaboration between the components of the system, whereas a state of perfect alignment is not only harmonious but is tightly focused onto a specific set of objectives. A business in a state of chaos will be unable to deliver products or services to the marketplace, whereas a business in perfect alignment will be capable of strategic flexibility through manoeuvre and response. It will also be able to achieve and sustain an advantageous strategic position and to translate a business vision into a set of 'implementable' strategies. Each organisation will therefore have an identifiable threshold which defines its minimum level of alignment and below which its performance will become dysfunctional (Boar 1994).

10.2 Strategy and Alignment

Two types of alignment are identified in the literature. The first type is to the alignment between an organisation's desired state and its current strategic position. This is called external alignment as it covers the alignment between the business and its market place. In this view strategy and alignment are inseparable as concepts to the extent that 'strategy is the movement of the business from a current state of [mis]alignment to a new and better state of alignment' (Boar 1994 p. 15). In extreme cases this strategic re-alignment is analogous to organisational transformation (Henderson and Venkatraman 1993) or business process re-engineering (Hammer 1990). The second type of alignment is internal alignment and refers to the alignment of the processes within the business (Boar 1994). For instance the human resource function, IT function and the business processes should be aligned in support of the business scope if the business vision and major strategic objectives are to be achieved. Concepts such as efficient customer response (Booth 1997) and techniques such as value chain analysis (Porter 1985) are employed to exploit an advantageous competitive position by aligning activities in the value chain.

There is a considerable body of evidence which suggests that it is the alignment between the IS and IT functions and the rest of the business which is of particular importance and which may be a critical success factor in many organisations (Broadbent and Weill 1993). 'There is a growing body of case material that demonstrates how IT systems have failed to deliver their promised benefits, how failure to build alignment has led to a failure to exploit IT effectively, and even how serious efforts to achieve alignment have failed' (Macdonald 1992). The alignment of IT strategies and infrastructures with business strategy has been an area of interest with senior IT managers for a long time and has figured in a number of surveys (e.g. Dickson *et al.* 1984, Ball and Harris 1982). In the CSC Index surveys carried out between 1988 and 1994, IT/business alignment appeared as the top issue (out

of twenty) twice, in second position four times and has never been placed lower than fourth (e.g., Index Group 1988).

A survey of chief information officers carried out by CIO Magazine in 1992 which sought to assess the IT priorities among this group placed the alignment of technology with business strategy as the top item of twelve. A similar survey in 1992 by Network World Magazine placed 'aligning IS and business goals' as the fourth of nine items. Also, in a survey published by Datamation magazine in 1994 which questioned IT managers about their perceived key issues, 35% of respondents felt that 're-engineering IT to align with company strategy' was critical and 38% felt it to be important, thus placing it in second position. In the SIM surveys the issue of 'IS/organisation alignment' has appeared in ninth place twice (in 1980 and 1994), in seventh place twice (1983 and 1990) and was placed fifth in 1986 (Harthog and Herbert 1986). A synthesis produced in 1993 from the results of a number of surveys concludes that 'IT - business alignment' was the second most important issue. A similar exercise carried out (on a different range of surveys) carried out in 1980 had placed alignment in ninth place out of ten issues (Boar 1994). The issue of IS/IT and business alignment is clearly assuming an increasing level of importance and must be included in the proposed linking method. This importance is examined in detail in the next section.

10.3 The Importance of Alignment

There is a consensus of opinion that business success does not depend simply on the harmonisation of business strategy and IS/IT (e.g. Macdonald 1992). It is apparent that a more complex alignment relationship exists between business strategy, organisational factors, management processes, IT infrastructure and the IS architecture (Henderson and Venkatraman 1993). The real objective of alignment should be to build an organisational infrastructure which is based on appropriate skills and internal business processes which reflect both the organisation's functional and technological strategies and its social and technical infrastructures and processes (Luftman 1997). This view implies that the concept of alignment should cover the following organisational factors (Macdonald 1991):

- The organisation's strategic position in its product/market arena (Macdonald 1991) as defined its relationship with the forces which act in its business environment. This is identical to the first component of the linkage between business strategy development and strategic IS/IT implementation (described in Chapter 7);
- The flexibility of the organisation's infrastructure as defined by its reach (i.e. access to IT resources), range (i.e. sharing of IS applications) and the degree of manoeuvrability or adaptability which the IS applications and IT infrastructure affords the organisation

(Boar 1994). This is similar to the second component of the linkage between business strategy and strategic IS/IT applications (described in Chapter 8);

- The organisation's ability to identify opportunities to exploit technological developments to achieve a desired future state in support of its business vision (Macdonald 1991). This is analogous to the third component of the linkage between business strategy and strategic systems development (described in Chapter 9).

Macdonald points out that strategy or infrastructure alignment can only be achieved by the use of a suitable supporting process,

Successful alignment is dependent on an appropriate management vision, both of the organisation's strategies and of the role that information technology plays in the execution of those strategies. Successful alignment is assisted by the use of an appropriate process, particularly one that reflects implementation realities.

(Macdonald 1992 p. 261)

At the same time, however, it is stressed that successful alignment cannot be guaranteed by the mechanical application of a process, and that any suitable process must reconcile a complex set of organisational, technical and personality problems. Such a support process must be sophisticated and capable of complex operations, as successful business and IS/IT alignment does not simply involve an increase in functional or process efficiency due to a state of harmony (Dutta and Doz 1995). Indeed, the alignment between infrastructures and processes can be used to transform business processes (i.e. to effect internal flexibility manoeuvres) and to create and exploit dislocations in the marketplace (Boar 1994). These factors are both important contributors to the strategic use of IS/IT for competitive advantage, which means that alignment should play an important part in the proposed method (Luftman *et al.* 1995).

10.4 The Benefits of Strategic Alignment

The business benefits that accrue from the successful alignment of IS/IT and the business cover all three eras of IT usage (Earl 1989). There is an association between the alignment of business and IT and the idealised stages of growth that categorise the ways in which organisations design, implement and operate IT strategies (e.g. Bhabuta 1988, Nolan 1979). Business/IT alignment benefits occur at three levels: efficiency, effectiveness and transformation, as in the benefit/beneficiary matrix (Gibson and Hammer 1988).

10.4.1 Efficiency Benefits

The role of alignment in support of operational processes has been recognised for such a long time that it is taken for granted,

The operations role is...distinguished by the creation and deployment of a technology platform that creates the capability of automating the entire set of business processes, as opposed to only the administrative activities. This role requires the deployment of an IT infrastructure that responds to and supports the chosen business strategy.

(Henderson and Venkatraman 1991 p. 203)

This type of alignment between business and IT reflects a functional efficiency orientation and therefore relates to the functional strategy level of the conventional hierarchical three-layer model of strategy (e.g. Hax and Majluf 1984). The main advantage of strategic alignment to an organisation at this level is to 'allocate efficiently its resources to support the chosen business strategy' (Henderson and Venkatraman 1991).

10.4.2 Effectiveness Benefits

The ability to develop strategies for IS and IT which are in alignment with the business strategy has been identified as an important factor in achieving a superior competitive position in a given product/market arena (Venkatraman and Kambil 1992), and for creating market place disruptions (Boar 1994). The effective use of integrated business and IS/IT strategies by the major players in influencing the structural characteristics of markets is well documented (Baron 1997). The same factor has also been effective in shaping the basis of competition in whole industries (e.g. Rotemberg and Saloner 1991). These examples are considered to be examples of effectiveness benefits, as successful alignment allows the organisation to focus on pursuing the opportunities that are most effective in helping achieve its business vision. Effectiveness benefits are therefore linked to strategic positioning and the exploitation of competitive potential in a given market.

10.4.3 Transformation benefits

The important role of IS/IT in effecting and enabling business process redesign (Earl 1994) and business process re-engineering (Manganelli and Klein 1994) is well documented. The benefits of alignment in this area centre around the organisation's ability to achieve the necessary flexibility to alter its processes and structures to achieve desired states in terms of its strategic vision and to avoid unwanted influences on its strategy. Optimum alignment is said to produce the benefits of 'perfect reach, perfect range and perfect manoeuvrability' (Boar 1994). This alignment needs to be multi-directional as it is implied that the business processes and structures may transform to match the capabilities of the organisation's IS applications and IT infrastructure. Transformation benefits are therefore linked to both strategic positioning (described in Chapter 7) and the achievement of flexible responses to environmental threats and opportunities (described in Chapter 8). Boar (1994) summarises the benefits that may accrue from achieving a perfect alignment.

First, performance levels of customer service activities will increase, and IS/IT can be used to enable the use of efficient customer response and time-based competition (Rich and Hines 1997) and for creating new business networks (Venkatraman 1994). Second, proactive strategies may be pursued and first mover situations exploited to the disadvantage of competitors (Lippman and Rumelt 1982). Third, the aligned organisation may employ a flexible IT infrastructure and responsive IS applications to cope with and benefit from the unpredictable environmental conditions which are a consequence of the strategic use of IS/IT (Russell and Muskett 1993). Fourth, the combination of the advantageous strategic position which the aligned organisation is able to achieve and the proactive and flexible strategic manoeuvres causes its competitors to deviate from their chosen strategies and to commit themselves to 'inept and defective responses' (Boar 1994 p. 33).

It is proposed that a series of successful IT-enabled business manoeuvres on the part of the aligned organisation creates 'carefully thought-out dislocations and exploitations' which cause the competitor to become 'trapped in an endless and exhausting game of catch-up' (Boar 1994 p. 34). This last claimed benefit is open to some question, as studies show that a strategy of copying another firm's IT-enabled manoeuvres is frequently successful (e.g. Ciborra 1991). Strategic managers appear to regard alignment as an extremely important issue and a key factor in achieving business success and this warrants the inclusion of a method for achieving the alignment of the business and IS/IT in the proposed linking method. A number of methods can now be examined for their ability to support alignment, but first it is necessary to establish the required features of such a method.

10.5 The Requirements of a Strategic Alignment Method

It is possible to identify a set of requirements for the proposed alignment method based on the foregoing section and on the research into the techniques identified in other parts of the research which deal with strategic positioning, vision and flexibility. The features, and the reasons for their inclusion, are as follows:

- **Compatibility** - as the technique should be compatible with the other components of the strategic linking method that are intended to aid strategic positioning, (e.g. vision and flexibility). The strategic alignment technique is critical to making the linking framework operational and is the pivot between the business and IS/IT strategies;
- **Practicality** - as the technique must be well documented with some indication that it has been successful or would be successful in practice. This would rule out theoretical frameworks, educational techniques and methods that are lacking technical support;

- **Scope and scale** - as the chosen method should not be too complex or too elaborate. It should be remembered that it is an element of a wider framework and is not a full framework in itself. Therefore, a method which has too large a scope or scale is likely to be compromised in terms of the requirements of compatibility and practicality.
- **Integration** - as the chosen method should be capable of integrating the elements of the organisation's strategy set (i.e. the business and functional strategies and the IS/IT strategies (Das *et al.* 1991). This is obviously a prerequisite for a strategic alignment model.

Having defined the requirements it is now possible to move on to examine the literature to identify suitable alignment models which meet these requirements.

10.6 Alignment Models

The literature contains references to a number of alignment models that have the potential to serve in this role in varying degrees. These are examined in turn for their suitability in achieving alignment in a typical organisation. The models exhibited some common basic characteristics. They all view the business and IS/IT strategies as existing in parallel and most agree that there is a need to produce alignment at successive levels of decomposition up to a point at which no further benefit is possible,

‘The optimum alignment of IT and business occurs when business strategy and IT strategy are developed together, so that each can influence the other to maximum advantage. Misalignment at any level results in a dysfunctional relationship between IT and the business’.

(Boar 1994 p. 26)

Some of the models are felt to have relatively little potential in this application, but it is possible to identify an adequate shortlist of suitable alignment models. These models are examined and assessed according to defined criteria that are categorised and described in the following sections.

10.7 An Organisational Development Model

Burn (1996) suggests a two-stage alignment framework that seeks to model the alignment of organisational strategy with the IS/IT strategy. The first phase, termed organisational alignment deals with the adjustment of the business strategy and ‘infrastructural’ factors (e.g. human resources) to suit the constraints of the current IS applications portfolio. The second phase is called IS alignment and is intended to carry out a complementary exercise in the IS domain.

The model uses strategic analysis techniques in each phase to identify an IS strategy which is appropriate to the organisation's position in an IS/IT stages of growth model (Burn 1993). Boar (1994) suggests a four stage model of alignment between the business and IS/IT strategies which suggests that as the alignment between these strategies improves, the organisation goes through four stages of increasingly beneficial states of development:

- **Functional Automation**

At this stage the major objective of the IS/IT strategy is to automate individual business functional areas. In this situation IS/IT is unlikely to have a strategic role within the organisation and there will be little linkage between the development of the respective strategies. IS/IT and business strategy alignment is therefore likely to be minimal in an organisation at this stage (Reich and Benbasat 1996);

- **Cross-functional Integration**

At this stage IS/IT is used to build systems which link the functional areas of the business that have been automated separately (e.g. forward integration of the primary activities of the value chain), resulting in 'islands of automation' (Venkatraman 1994). This implies a limited alignment between the IS strategy and the relevant business strategies (e.g. logistics, production or marketing) as the approach is essentially applications-based. There may be a more tenuous linkage between the IS strategy and the organisation's IT infrastructure (Boar 1994);

- **Process Automation**

At this stage the organisation has a strategy of using IS/IT to 'build process-centric applications that transcend functional organisational boundaries' (Boar 1994). This would imply a considerable degree of integration between IS/IT and the strategies for the business functions. The IS/IT functions will be perceived to have a strategic role and will be represented at a senior level in the organisation (Raghunathan and Raghunathan 1993);

- **Process Transformation**

Here the organisation uses IS/IT in a strategic manner to redesign business processes to enact business visions, to initiate and execute flexible manoeuvres and enable the organisation to achieve a desired competitive position.

The strategic importance of IS/IT in transforming business structures and processes at Stage 4 of this model is obvious, and subsequent models of alignment which represent transformation as a method of aligning IS/IT and business are referred to as transformational alignment models (Venkatraman 1994). The four stage model of alignment is well-suited to the identification of business benefits (described in Section 10.3) and exhibits the property of integration to some extent, as it has a stage which seeks to model the cross-alignment of the business functional areas. However, the model is

descriptive rather than prescriptive, and while it may be useful as an awareness framework (Earl 1989), it lacks the degree of detailed description, operational techniques, and practical guidelines or structure to make it workable (e.g. Reich and Benbasat 1994). Due to this lack of structure, the model would not be compatible with the other components of the strategic alignment method, and Boar's four-stage model will therefore not be considered for this application.

10.8 A Transformational Model

Venkatraman (1994) suggests a five-stage model 'for the purposeful use of IT to accrue perfect alignment'. The stages represent a hierarchy of levels of alignment that suggests that, as IS/IT improves its state of alignment with the organisation's strategies and functions/processes, it moves five stages of increasing impact on the business, as follows:

- **Localised Exploitation** in which IS/IT is used to automate individual business functions, almost certainly without reference to aligning these islands of automation with each other;
- **Internal Integration** in which IT is used to build common systems across the different business functional areas and to integrate and align local applications created during the first stage;
- **Business Process Redesign** where IS/IT is used 'in novel ways to create processes in synchronisation with business strategy' (Boar 1994 p. 29) and to build applications which enable and support restructured business processes;
- **Business Network Redesign** which involves IS/IT being used to integrate the organisation's business processes (particularly those on the value chain) with those of its suppliers and customers (and even allies or rivals) as one continuous system;
- **Business Scope Redefinition** where IT is used to create and exploit radical and innovative business opportunities and to 'enable management to undertake novel business initiatives' (Boar 1994).

In this transformational view the range of possible benefits to the organisation increases as the level of integration increases. Perfect alignment is achieved 'when IT is used to throw competitors off balance, creating the ability to take advantage of the resulting weaknesses and exploit the situation' (Boar 1994). The transformational model of alignment is well reported and has been used in a number of strategic applications, having featured in the MIT 90s study. However, in terms of the present research, it lacks the important ability to integrate the strategic components of the linkage between the business strategy and the strategic IS/IT applications development process. The five-level transformation graph may be a practical model of the use of strategic IS/IT applications to effect the transformation of business functions and is a useful framework for identifying such

applications in practice (see Figure 10.2). However, it lacks the features that are necessary to make it compatible with the other components of the research framework. Equally, its scope is not sufficiently broad, and its scale is not adequate for use in this application as it does not address the business issues which are important parts of an organisation's strategy set and for these reasons the technique is not selected for use with the research framework

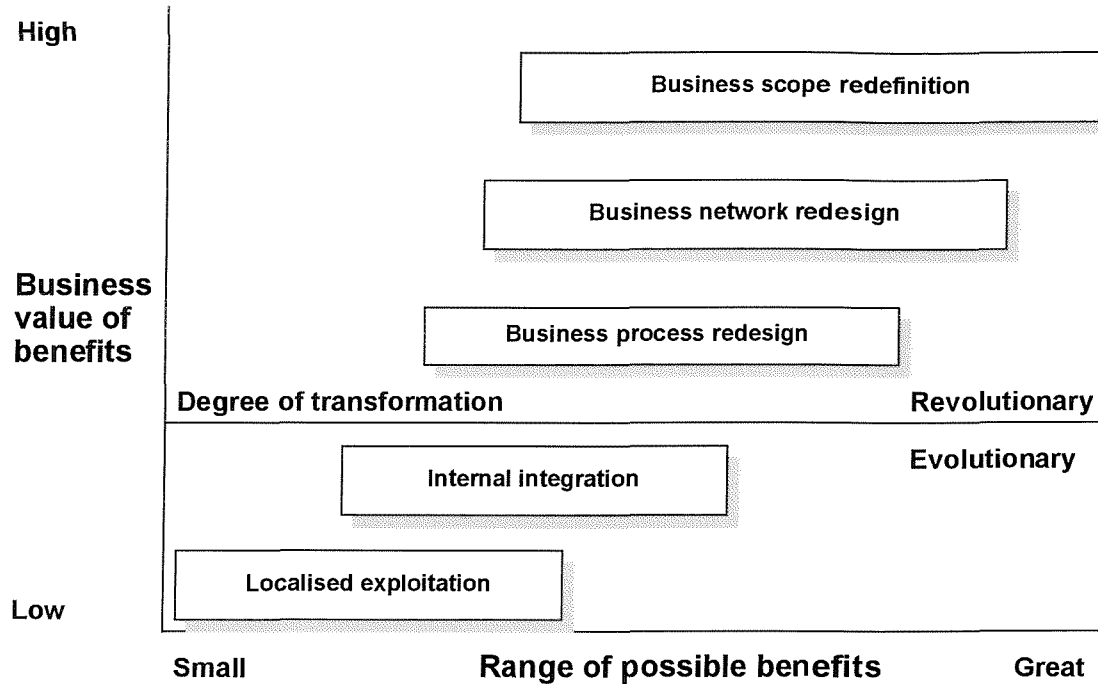


Figure 10.2 Levels of Transformational Alignment (After Venkatraman 1994)

10.9 A Functional Strategy Model

The complexity of the strategic arena in which cohesion must be achieved in a typical organisation is reflected in the strategic alignment model (SAM) and the associated strategic alignment process (SAP) which was one of the major deliverables from the Management in the Nineties research project (Henderson and Venkatraman 1994). The SAM framework recognises the complexity of the cohesion problem by including four domains that represent parts of the organisation's strategy set. These are: the business strategy, the organisational infrastructure and processes, the IT strategy and the IS infrastructure and processes. The former pairing represents the business dimension and the latter the technology dimension.

While SAM describes the fixed relationships between the domains, SAP represents the dynamic relationships. It uses the concepts of completeness (i.e. recognition of the place of all the domains in the strategy) and validity (i.e. the degree of confidence in the process which is given by the use of a domain anchor) in deriving a balanced strategic process (Henderson and Venkatraman 1994). The practice of alignment is conceptualised as a series of four triangular relationships that determine an organisation's competitive potential, business value, service level and technology potential. The more closely aligned the more effective these relationships will be (Venkatraman *et al.* 1993). SAP is an iterative cyclical model that is more manageable than other transformational processes such as BPR (Luftman *et al.* 1995), and yet which demonstrates a flexible form of alignment (Macdonald 1991). There are four elements of the SAP, as follows:

10.9.1 Business Strategy

The SAP model views strategy from a voluntaristic as opposed to a deterministic perspective (Astley and van de Ven 1983). In this view the business strategy process includes many complex definitions and concepts (Venkatraman *et al.* 1993). The SAP seeks to simplify this complex arena by focusing on three central attributes (Luftman *et al.* 1995). First, the business scope which deals with product/market strategies, second, distinctive competencies including the attributes of strategy which relate to competitive position and differentiation of the firm, such as. quality, price/performance, added value, distribution channels (Porter 1980) and third, business governance which includes the business management and networking strategies (Jarillo 1988).

10.9.2 IT Strategy

The concept of an IT strategy is open to a variety of definitions and assumptions (Henderson and Venkatraman 1994) and yet is identified as key part of the strategy set of many of the most successful companies (Earl 1989). SAP recognises three dimensions. First, there is technology scope, which refers to the range of technologies and IT applications (e.g. imaging systems, artificial intelligence) which the firm deploys. Second, there are systems competencies that focus on the ability of the technology to support the business strategy (e.g. reliability and flexibility). Third, there is the issue of IT governance, which deals how the technology is managed, including joint research and development arrangements (Giridharan 1997), EDI networks (Galliers *et al.* 1995) and facilities management agreements (Rotemberg and Saloner 1991).

10.9.3 IS/IT Infrastructure and Processes

The SAP model seeks to represent the importance of the applications portfolio to the business strategy by the following dimensions. First, the IT infrastructure/IS architecture

which represents the strategy relating to applications, data and technology configurations (Parker *et al.* 1988). Second, the processes that are concerned with systems development, maintenance and control and third, the organisation's skills, defined as the capabilities available to manage the firm's infrastructure and applications.

10.9.4 Organisation Infrastructure and Processes

In this category the SAP model seeks to address three dimensions. First, there is the administrative infrastructure, including the organisational structure, functional roles and reporting relationships (Raymond *et al.* 1993). Second, the processes or 'the articulation of work flows and the associated information flows for carrying out key activities' (Henderson and Venkatraman 1991) and third, skills which represent the capabilities of the firm's human resources to enact the business processes which support the corporate strategy. The authors of the SAP model propose a dynamic process which seeks to devote 'simultaneous or concurrent attention to all four domains' (Henderson and Venkatraman 1994). In other words, alignment is perceived as being a cross-domain process that overcomes the limitations of alignment models based on bivariate relationships between the strategy and technological domains. This is an example of what Argyris (1982) termed single loop processes and which are argued to be 'myopic and dysfunctional' (Henderson and Venkatraman 1991) and therefore unlikely to ensure completeness. The SAP seeks to use a double loop transformational approach (Argyris 1977) using a validation process based on the work of Henderson and Sifonis (1988) and Mason and Mitroff (1981).

In this view, unidirectional (single loop) approaches are less valid than focused double loop approaches. The SAP model employs the concept of a domain anchor to promote focus and a cyclical process to ensure completeness. The problem of focus in strategic alignment is compounded by the complexity of the process and the scale and scope of the issues (Luftman 1997) and SAP seeks to address this by decomposing the SAM into a series of manageable steps which can be undertaken in sequence. The problem of validity is addressed by the iterative examination of triangular relationships between the elements of SAM in line with the series of steps. Each of these relationships relates to a problem domain based on one of the SAM elements, and the intention is to achieve alignment in this domain before moving on to the next one. The method of ensuring validity that is at the heart of the alignment process is applied to the problem domains successively and the intention is to build alignment progressively in the SAP model by producing alignment in each problem domain progressively (Henderson and Venkatraman 1991). This is arrived at through a three-element model, the components of which are as follows:

- **The domain anchor** is the component in each problem domain which provides the input to the process is termed the domain pivot, and its contribution to achieving improvement in alignment within the problem domain is considered. The domain anchor therefore provides the change forces that effect the domain. According to Macdonald (1991) the initial domain anchor of a SAP cycle should ideally be an external component to show the environmental influences on the model. In most cases, 'what is available from the global technology platform and can be adopted as an IT strategy is more constrained by the capability of the organisation to exploit the technology than by the capabilities of IT itself' (Macdonald 1991). This implies that SAP should start with the IT strategy as the domain anchor;
- **The domain pivot** is the problem area that is being examined within each domain and is the subject of the alignment exercise at that stage. The domain pivot at the start of the SAP should also be an external component and should reflect the organisation's environment as this is the source of the threats and opportunities to which the SAP must respond. The domain pivot should be the business strategy in cases where the IT strategy is being used as the domain anchor;
- **The impacted domain** is the component 'which is affected by any changes to the domain pivot and (which) may be a major constraint on the changes that can be adopted in the domain pivot' (Macdonald 1991).

The domain anchor therefore acts as the input to the process, beginning with the first attempt at alignment in the first problem domain. If this is the IT strategy, a technology audit will be used to identify the potential of the present and planned IT infrastructure in business terms (e.g. by SWOT analysis). The domain pivot is the component that is confirmed and improved by the input, which in this example would be the business strategy, which would be developed to recognise and achieve the potential of the IT strategy. It is likely that there will be some constraints on the freedom to change the domain pivot, which can be recognised by the status of the strategy at the beginning of the process and by the implications of the changes for the impacted domain (Macdonald 1991 p. 314). The implication is that complete alignment between business strategy (i.e. the domain pivot) and IT strategy (i.e. the domain anchor) would not be possible if the changes which would be required to the organisational infrastructure and processes (i.e. the impacted domain) are not feasible. The process of alignment between the domain anchor, the domain pivot and the impacted domain is repeated for each of the problem domains as follows:

- **Competitive potential** - the first problem domain refers to the 'competitive potential' of the organisation and is based on the business strategy component. This involves assessing the role of the IT strategy in offering products and services and in

automating parts of the infrastructure and processes, while recognising the transformational relationship between the organisational infrastructures and processes and the business strategy;

- **Business value** - the second area of alignment is based on the 'organisational infrastructure and processes' component of the SAM and examines the way the IS infrastructure allows IS products and services to be offered to the organisational infrastructure. This assumes that a linkage exists between the IS infrastructure and the business strategy such as the existence of a strategic information systems plan (Fidler and Rogerson 1994) or an applications portfolio management function;
- **Service level** - having secured a degree of alignment in pursuit of increased business value, SAP moves on to examine the service level which is provided to the organisation by the IS infrastructure. Also, the extent to which the IT strategy (i.e. the technology part of SAM) is capable of transforming the IS processes is examined;
- **Technology potential** - this problem domain introduces the potential of IT to affect the business strategy 'and thus achieve the progressive harmonisation and interdependency that is required by the whole organisation' (Macdonald 1991). With this, a single iteration of the SAP cycle is complete.

The operation of the process on each of these problem domains constitutes a single cycle or iteration, and the law of diminishing returns applies in knowing when to stop,

Iteration to perfection at infinity is unproductive. A more useful goal is to seek significant constructive improvement from each process stage and to stop when it is clear that the effort involved in another cycle is not justified by the anticipated improvement or refinement.

(Macdonald 1991 p. 315)

In other words, the SAP should terminate when further improvement is impossible within the organisation's planning horizons and within its resourcing capabilities. The first notable feature of the SAP model is the distinction between IT strategy and IS/IT infrastructure and processes and between business strategy and organisational infrastructure and processes. This separation goes beyond the literature on business strategy, particularly the work of Snow and Miles (1983), which recognises the separation of the external alignment between the business and its product/market arena and internal alignment, which concerns the alignment of the firm's organisational structure, processes and systems. This separation is unrealistic in view of the implications of the strategic use of IS/IT, which implies that the product/market arena is affected by strategic IS/IT applications as much as it affects them,

As we consider the capability of using emerging IT capabilities to redefine market... characteristics as well as re-orientate the attributes of competitive success, the limitations of a functional view becomes readily apparent.

(Henderson and Venkatraman 1991 p. 206)

This is significant in the context of the present research, as it indicates that the type of alignment defined by the SAP model is complementary to the strategic positioning component of the linking model (described in Chapter 7) and will therefore fit well into the proposed alignment framework. In addition the model and process have been validated empirically in a number of research areas. Henderson and Thomas (1992) assessed the alignment of the business and IT domains in the strategic processes of US hospitals and discovered that a high degree of alignment indicated the successful achievement of business objectives and the effective deployment of IT resources.

Luftman *et al.* (1995) studied the alignment practices of three hundred US organisations in which they identified inhibitors and enablers to alignment and argued that by focusing on these factors firms can improve the effectiveness of their strategic alignment processes. Luftman *et al.* (1995) validated the existing SAM/SAP perspectives on alignment and developed a model called strategic fusion which describes a combination of two of the cross-domain perspectives which was found to occur frequently in the literature and Luftman *et al.* (1993) also validated SAM/SAP empirically. The strategic alignment process is probably the most widely published alignment model and is documented and described in more detail than any of the other methods included in this chapter. This factor contributes to SAM/SAP having a high level of practicality, which is reinforced by the strength of the techniques that are contained within the process. The iterative and gradual adjustment of the model in a move towards alignment (i.e. the use of the domain anchor, pivot and impacted domain) is a dynamic approach (Henderson and Venkatraman 1991). This is likely to be compatible with the other methods and models which have been suggested for use in the research framework. SAM/SAP can be used as a descriptive model with the potential for use as an awareness framework. It also has features that enable it to function as a prescriptive model (Henderson and Venkatraman 1994) which has been used and validated in practice (Luftman *et al.* 1995, 1993). SAM/SAP also caters for the domains of strategy and infrastructure (i.e. business and technology), which is important for integrating the IS/IT infrastructure with the business strategy (Ward 1987). The design of the model is founded on sound theories of bivariate fit and cross-domain alignment and has a high degree of completeness and validity (Henderson and Venkatraman 1993) which is reinforced by the practical nature of the techniques which are contained within the model. Due to its functional and 'integrational' approach, its sound underpinnings and its pragmatic range of techniques, it is likely that SAM/SAP will be

compatible with the other models that are suggested in the present research. It is therefore decided to select SAM/SAP to support the strategic alignment component of the composite strategic linking method.

10.10 Architectural Models

One possible approach to strategic alignment is to define architectures for the strategic components to guide their development or transformation. In this view, architecture is important for integration as well as planning,

The structure of information technology for business...in the past we have solved problems through separate strategies for data, communications and applications. Architecture brings these together.

(Brockbank 1987 p. 14)

There appears to be a consensus that there are a number of factors that impede the use of architecture to achieve alignment, of which the following are significant:

- There is a lack of common agreement on the definition or description of architectural terms or processes;
- There is no consistent or meaningful notation to describe architectures that are identified or produced;
- There is no accepted way of validating or verifying architectural deliverables.

Nevertheless, an analysis of the literature on strategic alignment identified two methods that are architectural, as they seek to form a set of blueprints for the socio-technical systems of the organisation (e.g. data, processes and communications). This will guide the future development of IS applications and IT infrastructure in line with a designed strategy (as described in Chapter 4). These methods are as follows:

10.10.1 Mulciber

The Mulciber method consists of a series of architectural frameworks or 'high level structures that define what an architecture should embrace but do not go into any detail of how to complete the framework item by item' (Boar 1994). In other words the method uses one or more of a number of matrices to act as 'checklists' and diagrams to act as models. The Mulciber method is essentially eclectic and contingent in its approach as it 'may be adopted at the user's discretion to provide more or less detail according to the individual's goals and objectives' (Boar 1994). The author recommends the use of three proprietary matrix frameworks that are commonly used by the CSC/Index Foundation, the IBM/Zachman organisation and the Gartner Group. The recommended diagramming techniques are also drawn from proprietary planning methods, including the DEC NAS architecture and IBM's SAA architecture. The aim of the method is to develop layers of

architecture (e.g. infrastructure, communication and processing) to define the attributes of reach, range and manoeuvrability and takes a combinatorial approach which shares many features with the principals of the materials requirement planning (MRP) systems used in manufacturing. The author of the method suggests a bottom up approach in which primitives or elementary aspects are identified initially, and the various architectures are produced by combination in the manner of sub-assemblies. The method as published contains a wide and varied range of techniques, templates and supporting documents, illustrated by the use of examples and case studies (Boar 1994). However, the method is extremely complex and difficult to understand in theory and probably need considerable experience to apply in practice. In addition, there appears to be a focus on the technological issues of alignment at the expense of the business strategy issues. The potential of the method to achieve integration is low, and therefore the level of compatibility with the other aspects of the research is considered to be low.

10.10.2 Computer Architecture Strategic Plan

The Computer Architecture Strategic Plan (CASP) alignment method is a part of the Nolan, Norton and Company (NNC) Engineering Design Methodology for Building Architecture (Nolan and Mulryan 1987). Unlike Mulciber, CASP seeks to combine top-down and bottom-up approaches that begin at the top with a direct linkage between the company business strategy and at the bottom with an inventory baseline of the various technology components. These layers are linked in a series of planning and baseline blueprints using a conceptual architecture of four blueprints which are the deliverables from the design process and which are intended to produce an aligned IT architecture (Nolan and Mulryan 1987). These are: data storage and access, applications processing and access, technology and communications (see Figure 10.3).

The relative importance, sophistication and degree of detail of each of these blueprints are decided by assessing three key performance factors. First, the maturity of the technology, second the maturity of the external body of knowledge of the technology or applications and third, the ability of the company's staff to manage the technology (Nolan and Kolb 1987). According to the CASP method, the process of building an architecture for alignment is gradual and systematic, and may be achieved by a number of approaches, such as the following:

- **Ratcheting** is a process of incremental development undertaken with the objective of showing short-term benefits from the architecture/alignment effort and promoting organisational learning about alignment (Nolan and Mulryan 1987). This seeks to avoid two of the problems of architecture development, the organisational effort and the lack of organisational experience (Zachman 1986);

- **Prototyping** is an approach to architecture development that has a considerable history in systems development. In the case of alignment it involves identifying a segment of the organisation which has a strategic identity (e.g. a SBU) and developing a blueprint for alignment for which the results may be evaluated empirically and developed or abandoned according to the results of the exercise;

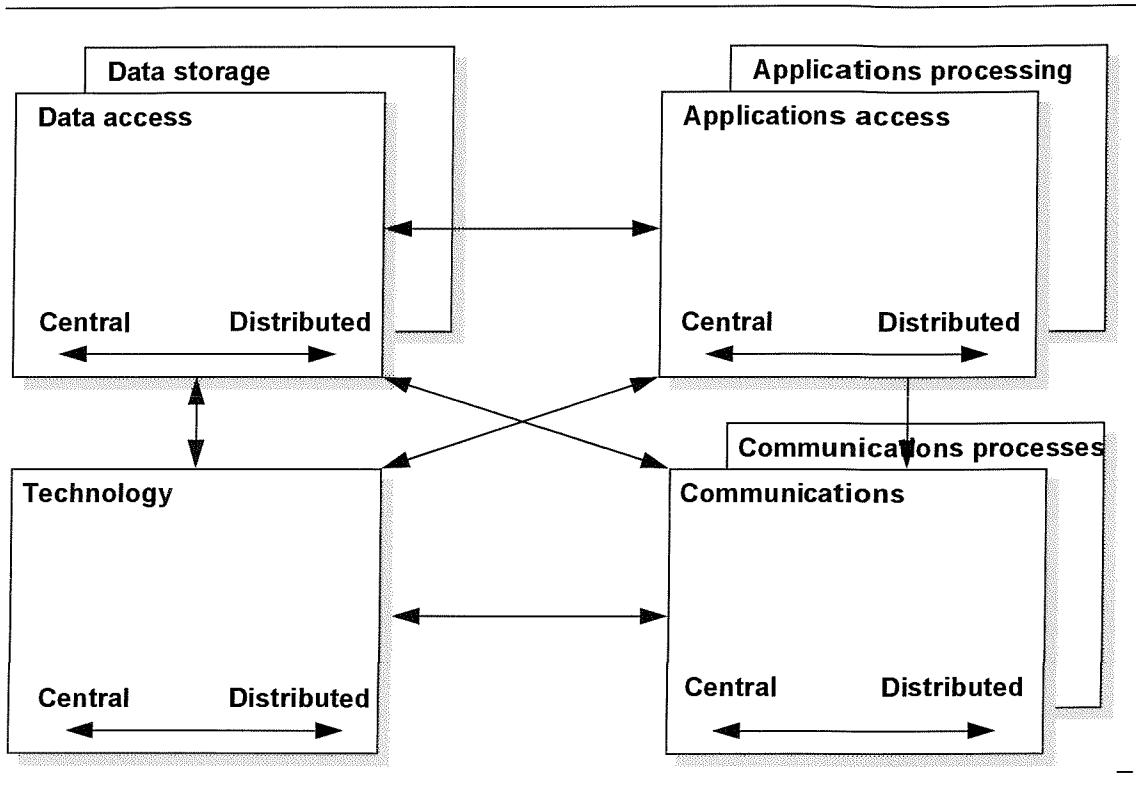


Figure 10.3 CASP Conceptual Architecture (After Nolan and Mulryan 1987)

- **Recursion** is an approach that assumes that perfect alignment is impossible to achieve, even in stages, and which uses a series of prototyping architecture projects in different parts of the organisation. These can be subjected to successive revisions in moving towards complete functional improvement.

In CASP the key success factors and the approaches described above are instrumental in making the process of architectural alignment possible by simplifying its inherent complexity but there is also a prescribed set of steps which, it is contended, constitutes a method, which is as follows:

- Defining the architecture so that a definition is obtained of what the term architecture means in the context in which it is being used. The NNC view is that architecture is 'the structure of IT for doing business'. It is stressed that this definition, which is 'at a conceptually high enough level...yet (is) specific enough to capture...what

differentiated architecture from other IT planning approaches' (Nolan and Mulryan 1987), may differ according to the nature of the application;

- Getting stakeholders to buy in, as developing an architecture in a typical application involves a complex group of stakeholders whose expectations may be difficult to express and are often in conflict. To resolve these issues CASP uses a stakeholder analysis approach which uses techniques called an architecture stakeholder map and stakeholder group matrix (Nolan and Kolb 1987). Although it is stated clearly that this occurs after the first step, it is difficult to see that a definition of the architecture could be produced before a 'community of interests' (Nolan and Mulryan 1987) is identified;
- Determining the key architecture questions involves an analysis of the company's existing architecture. This is done by asking key architecture questions that are intended to provide a focus for 'making Architecture an integral part of corporate business strategy' (Nolan and Mulryan 1987), in other words, a definition of the current architecture is a precursor to strategic alignment;
- Baselineing the company architecture constitutes an audit of the company's IT capabilities, investments and governance following the architectural schema of data storage and access, applications processing and access, technology and communications (see Figure 10.3). 'Deriving desired or planned blueprints from a top-down business vision...Baseline blueprints are derived from the bottom-up assessment, planned blueprints from the top down' (Nolan and Mulryan 1987). This distinction is important in distinguishing IT planning approaches (which attempt to baseline) from architectural approaches (that feature top-down planning). The role of business vision is introduced at the next stage;
- Initiating the strategic vision attempts the alignment of the organisation's business strategy and IS/IT architectures. The technique is based on the assumption that there is 'usually a wide gap between the desired architecture and the and the baseline...and over time, the linkage...can be tightened' (Nolan and Mulryan 1987). The developers of CASP stress that a strategic business vision is necessary to provide the criteria for developing the desired architecture from the baseline and is therefore an absolute prerequisite for the whole alignment process. CASP does not deal with the development of a business vision, although a later NNC technique called strategic vectoring does so (Mulryan 1988, Norton 1987). In CASP the process of alignment is achieved through organisational transformation based on the effective use of technology;
- Technical organisational transformation appears to be a major drawback of the method, as CASP tends not to be prescriptive about this stage. The recommendation is to develop a Computer Architecture Product Spectrum (CAPS) and a Computer

Architecture Tactical Plan (CATP). The CAPS describes the potential of the external technology environment (a major influence on the IT strategy in SAP) which must be integrated with the existing IT portfolio as identified in the baseline IT audit at Stage 4. The CATP focuses on the pragmatic reaction needed to gain immediate benefits from emerging technologies, balanced with the technologies' overall role in the company's computer architecture. Aligning the CAPS/CATP architecture and the CASP architecture is based on balancing a 'slack' management style (i.e. encouraging experimentation and innovation) against a 'controlled' style that seeks to formalise the applications which are produced by slack development methods and to apply and promote them in a controlled manner.

CASP uses an approach that seeks to identify an orthogonal form for the organisation (i.e. the architecture) and to produce blueprints that describe the architecture in both technical and business terms. The CASP method includes techniques that would promote links with the business strategy (particularly with the development of the business vision through the stage of initiating the strategic vision) and has a strong 'integrational' element through the technical organisational transformation stage. These aspects would make CASP a potentially useful framework, but the techniques that are used in CASP are not particularly compatible with the techniques used in the methods that have already been chosen. The method exhibits a definite weakness in this area, as the basic techniques at the beginning of the CASP lifecycle are little more than guidelines and checklists.

10.11 Choice of the Proposed Alignment Method

Having described the features of the various methods for achieving strategic alignment between an organisation's strategic components, it is necessary to select a suitable method (or a combination of techniques) for inclusion in the proposed strategic linking method. The criteria for assessment are those that are described in Section 10.5 and the chosen method of analysis is the technique of feature analysis which was also used to analyse the proposed methods for achieving strategic flexibility (see Section 8.7) and supporting strategic vision (see Section 9.5). In this case, however, the panel of experts that was used for these exercises did not have the practical or academic expertise in the alignment techniques. At one stage the researcher considered recruiting another panel of experts with the necessary experience. However, a reappraisal at a supervisory meeting of the reasons for using the panel prompted the observation that the technique had only been used because of the complexity and number of candidate techniques in the domains of strategic flexibility and strategic vision. Since the literature search into the domain of strategic alignment had identified a smaller number of techniques, it was considered that the decision-making process was more straightforward. It was decided that the researcher could compare and assess the alignment techniques from information collected in the

literature search. However, experience in the two previous domains had shown the value of Feature Analysis in rating the techniques and recording the results. The researcher therefore used the technique alone to produce a subjective analysis of the available strategic alignment techniques. In this instance the basis of the comparison was the set of required properties that are required from a strategic alignment technique that were derived from the literature survey. An examination of the features of the candidate methods produced the following findings, rated in terms of the extent to which each category of alignment technique supports each property.

10.11.1 Compatibility

This measure is particularly important, as strategic alignment is a pivotal factor in bringing cohesion to the proposed linking framework. It is therefore very important for this feature to be represented strongly. The organisational development method and the two architectural models were not felt to perform strongly in this area. The techniques which they employ are dissimilar to those used in the other components of the proposed framework and the general approaches are not of the same order. The transformational model scored more highly in terms of compatibility because of its inherent simplicity. The SAM/SAP method is more complex and does not use similar techniques to the other parts of the proposed method, but is felt to be compatible because the outputs from the other components (e.g. strategic vision and positioning) can form the inputs to SAM/SAP. The transformation method and SAM/SAP are therefore the most compatible with the other components that are already chosen for the strategic linking process. This is an important factor in choosing an alignment method to form a part of the strategic linking framework.

10.11.2 Practicality

It must be possible to use the proposed alignment method in practice with a high probability of success. This requirement tends to rule out awareness frameworks (Earl 1989) and methods that are suggestions or are undocumented. The organisational development method again did not feature well in this respect and the transformational model and Mulciber were only slightly more practical in nature. CASP was felt to be better documented, and was once supported by one of the most respected management consultancies. However, SAM/SAP offers the best balance of features to make it usable in practice and is therefore the most practical of the alignment methods.

10.11.3 Scope and scale

There are two areas in which a balance must be achieved. First, the balance between being too simplistic and too complex, and second between the coverage which the framework offers and the difficulty of applying the method in a typical situation. This feature was probably the most difficult to assess, in that there was relatively little to choose between

the candidate methods. The organisational development and transformational alignment methods are both simplistic and are rather limited in their coverage of the linking process. The architectural approaches (i.e. Mulciber and CASP) have a wider coverage and a greater degree of richness in terms of addressing the considerable problems of alignment. SAM/SAP was felt to have a satisfactory coverage of the process and achieve the best balance between the factors stated above, making it the most satisfactory method.

10.11.4 Integration

This feature is possibly the most important of those which are to be considered as assessment criteria. It is vitally important to integrate the elements of the organisation's strategy set into an effective whole, and this is a prerequisite for the alignment component of the proposed linking method. The integration issue is more clear-cut than the others in terms of assessing the difference between the candidate methods. The organisational development and transformational alignment methods are lacking in features which aid the integration process as their techniques tend not to recognise the other strategic elements of the organisation as well as the other candidate methods. The architectural approaches offer more potential in this respect as they include these other elements in the architecture, but SAM/SAP was felt to be the best method in terms of its ability to integrate the strategic frameworks.

Method category	Compatibility	Practicality	Scope/scale	Integration
Organisational development	*	*	**	*
Transformational alignment	***	**	**	*
SAM/SAP	***	****	****	****
Mulciber	**	**	***	***
CASP	**	**	***	***

Figure 10.4 Feature Analysis of Strategic Alignment Methods

The result of the feature analysis carried out by the researcher is that SAM/SAP produces the highest scores in all aspects of the feature analysis except for the dimension of compatibility, in which it featured joint first. SAM/SAP is therefore the recommended method for achieving strategic alignment. A summary of the feature analysis of the candidate methods is shown in Figure 10.4. The entries in each cell of the table represent

the academics' subjective judgement of the extent to which the properties of the candidate method support the requirements of a strategic alignment method as a part of the proposed method.

10.12 Summary

The concept of strategic alignment or creating cohesion between the components of an organisation's strategy set is central to the idea of producing a strategic linking framework. Surveys appear to indicate that the issue of strategic alignment is held to be very important by IT professionals and strategic managers. It is therefore important to include an alignment method in the proposed linking framework and the requirements of such a method are identified in this chapter. A number of approaches to alignment are examined, and various methods of achieving alignment that fit in with these approaches are analysed using a version of the feature analysis method. All the methods have something to recommend them. The two architectural methods (Mulciber and CASP) and the strategy and infrastructure alignment method SAM/SAP exhibit more of the features which are identified as being desirable, and SAM/SAP is shown in the analysis to possess these features most strongly. SAM/SAP is therefore chosen to represent the strategic alignment component of the proposed strategic linking framework. In the next chapter the proposed framework is described and a method of applying it to the strategic linking process is suggested.

Chapter 11

Construction of the Proposed Linking Framework

The previous four chapters described the four components of the linkage between business strategy and the development of strategic IS/IT applications, namely strategic positioning, strategic flexibility, strategic vision and strategic alignment or cohesion. The importance of each of these components to the strategy process was examined, and existing techniques for achieving the objectives of each component were evaluated and recommended. While each of these sets of techniques may be effective in supporting each component, in order to support the whole strategic development process it is necessary to combine the techniques into a workable method. A number of alternative models are examined in this chapter, and a method based on a two-part framework is proposed which defines the architecture of the model and a process that describes the application of the method in practice.

11.1 The Requirements of the Proposed Method

To be effective in practice, it is felt that the linking method has to have some basic properties. First, it must be represented by a model or framework that describes it succinctly and which aids understanding and communication. Second, it must be capable of being altered or tailored to fit individual applications, either by modifying the constituent techniques or by including them selectively. Third, it should have an appropriate scope and scale of the application area. The proposal has more in common with most systems analysis and design methods than with most business strategy frameworks, which tend to be more limited in scope and which tend to be based on a single framework or technique rather than a set. It is therefore necessary to examine briefly the nature of IS development methods (or methodologies) and the various models on which they are based. It is beyond the scope of this research to explore the differences between method and methodology. It is generally accepted that there is a distinction between them (Angell and Straub 1993), but a difference of opinion exists on what distinction is. One view identifies a philosophical difference.

The terms 'methodology' and 'method' tend to be used interchangeably, although they can be distinguished insofar as a method is a concrete procedure for getting something done, while a methodology is a higher-level construct providing a rationale for choosing different methods.

(Olga 1988 p. 90)

Another view sees a structural distinction between the terms, and defines a methodology as a consistent framework (Vessey and Glass 1998) that provides guidance to an approach

and contains a series of tools and techniques (Brinkkemper 1996) that are applied to the physical tasks in hand (Palvia and Nosek 1993),

A methodology is a comprehensive procedural framework directed towards accomplishing a particular change in the object system ... a method is a description of a specified technique in a symbolic language.

(Welke 1983)

For the purpose of this research, the proposed framework fits the former definition best, so the term method will be used, unless reference is being made to other work where 'methodology' is used. By this definition Avison and Fitzgerald appear to be describing a method when they offer the following definition:

A methodology is a collection of procedures, techniques, tools and documentation aids...a methodology will consist of phases, themselves consisting of sub-phases, which will guide [the] choice of techniques that might be appropriate at each stage of the project and also help...plan, manage, control and evaluate...projects.

(Avison and Fitzgerald 1995 p. 4)

A method is more than a collection of these things and must be based on some philosophical view and Madison (1983) believes that this philosophical aspect is inextricable from the other parts of the method. For the purposes of the research, this definition (the framework of the method) will encompass two aspects. First, the model (i.e. the static architecture defining the relationship between the components) and second, the process (i.e. the dynamic way in which the components of the model are enacted in the form of tasks) and the proposed method will follow this framework. This flexible view of a method is extended by Iivari (1987), who advocates using methodologies that allow their constituents (i.e. the techniques or tools) to be adjusted and applied to suit particular problem situations. This eclectic approach is called method engineering (Brinkkemper 1996) and is based on the observation that methods are continually being adapted to changing circumstances. The method with the most appropriate configuration is called the 'situational method',

Situational method engineering aims at harmonisation of methods by providing rules to configure project-specific methods out of fragments from existing standard methods. It stems from the need for controlled flexibility, which is a compromise between the *ad-hoc* ... and the rigid application of methods.

(Verrijn-Stuart and Olle 1994)

The aim is to produce a compromise between great flexibility with little control over the process (i.e. an *ad hoc* approach) and little flexibility with a high degree of control (e.g. a

structured method). The compromise is called controlled flexibility (Verrijn-Stewart and Olle 1994) and has a parallel in the work of Argyris and Schon (1979). This identifies a difference between an espoused theory and a 'theory-in-use' that has been extended to describe the phenomenon of a method-in-action as applied by a practitioner deviating from the method as envisaged by its creator:

Thus, it is suggested that methodologies are never applied as originally intended. Different developers will not interpret and apply the methodology in the same way, nor will the same developer apply the same methodology in the same way in different development situations. Therefore, on any development project, the methodology-in-action is uniquely enacted or instantiated by the developer.

(Fitzgerald 1997 p. 250)

This view is reinforced by studies which show that only a small minority of the users of commercial methods follow every task and stage rigorously and that organisations departed from the method in detail rather than in general and deliberately rather than arbitrarily (Fitzgerald 1996). This indicates that methods can be over-prescriptive in their approach, and can offer redundant amounts of detail and suggests that a more general and contingent approach is likely to be more successful in practice, particularly in an unstructured and dynamic application (Markides 1999). The situational approach is therefore chosen for the proposed strategic linking method, due to the complex and changeable nature of the strategy-setting process. A range of techniques will be included in the proposed method to support each of the linking components (i.e. strategic positioning, strategic vision, strategic flexibility and strategic alignment), but decisions regarding their application will be left to the practitioner.

11.2 Rationale for the Design

One of the major problems in designing the proposed model is defining the relationships between the strategic components in terms of its architecture (i.e. the static relationships). Another major problem is deciding the timing or sequence in which the techniques will be applied (i.e. the dynamic or process-based relationships).. In the context of the research, it is not proposed to produce a full-house method with all the attendant documentation and guidelines of a conventional systems analysis and design method. The techniques that have been recommended in Chapters 7, 8, 9 and 10 are self-explanatory, and so the proposed method will guide the practitioner in their application rather than describing them in detail. The problems which this may create are at least partly relieved by the proposed contingency nature of the method (i.e. any unnecessary steps or techniques can be omitted). This approach is similar to that of the Multiview IS development method, which is described by its inventors as an exploratory method (Avison and Wood-Harper

1995). It supports the process of examination and analysis of a problem situation, rather than being intended to provide a route to a specific design or implementation. This concept fits well with the philosophy behind the design of the proposed strategic linking method. In order to define the architecture of the linking model, it is necessary to re-examine the relationship between the components, as described in the following section:

11.2.1 Strategic positioning

The strategic positioning component embraces the need to identify and achieve a strategic position in relation to influential forces in the business environment. In many organisations it is used as a precursor to developing a strategic IS/IT application, but is essentially goal centred in nature and therefore gives only partial coverage of the strategy development process.

11.2.2 Strategic flexibility

The function of the strategic flexibility component is to ensure that the organisation's strategic position can be maintained in the face of a rapidly-changing business environment and that strategic IS/IT applications will continue to support aspects of the strategic vision in the long term (Das and Elango 1995). This component is important in ensuring that IS/IT implementations are robust and durable and that the costs of maintenance and change are controlled.

11.2.3 Strategic vision

This component of the strategic linkage process involves the development and promulgation of a business vision for the organisation that defines in general terms its future state (Stewart 1993) and long-term direction. Vision development is often a prelude to the definition of a particular business strategy but is rarely grounded in well-defined objectives.

11.2.4 Strategic alignment

None of these strategic components exist in isolation, and the strategies which are created by the strategic development process need an element of cohesion and alignment to ensure that they function together. The strategic alignment component is important in ensuring an organisational fit between the organisational factors (e.g. the business strategy and the organisation structures and processes) and the strategic IS/IT applications which are to be developed by the use of the model. The proposed strategic process model exhibits two types of relationship between the components: first, there is the static relationship which represents the fit between the components in terms of an architecture describing their interaction as 'domains' (Henderson and Venkatraman 1994). This architecture, which is

essentially theoretical, is important in understanding the nature of the linkage between the business strategy generation process and the development of strategic IS/IT applications. Its is subsequently referred to in this work as the Strategic Linkage Model (SLIM). Second, there is the dynamic relationship between the components, which represents the essentially practical requirements of the strategic IS/IT model, and which recognises the real-world constraints (e.g. time and resource availability) that apply to the strategic IS/IT application development process. It is postulated that this dynamic relationship is crucial to the effectiveness of the process of linking the business strategy to the implementation of strategic systems. The proposed process is therefore referred to subsequently as the Strategic Linkage Process (SLIP) and the complete method (architecture and process) is referred to as SLIM/SLIP.

11.3 The Strategic Linkage Model (SLIM)

A number of models have been proposed to represent the relationship between organisational strategies or strategic components. Earl (1989) suggests a linkage between the IS strategy (defining the applications) and the IT strategy (defining the delivery) which is based on the IT strategy providing an architecture within which the IS strategy can develop and the IS strategy providing a charter for IT acquisition. Earl suggests that this 'delineation of strategies is consistent with strategic management thinking in general' but does not elaborate on the uses or the usefulness of the linkage model, although he implies that its purpose is to prompt or aid the development of the relevant strategies (Earl 1989). Henderson and Venkatraman (1994) describe a linkage model that would appear to offer a richer depiction of strategic linkage. It identifies four strategic domains (two relating to strategy and two to infrastructure) and suggests three types of relationship between them. The domains are as follows; business strategy, IT strategy, organisational infrastructure and processes and IS infrastructure and processes. The three dominant types of relationship between the four domains are termed bivariate fit, cross-domain perspectives and strategic alignment. As these relationships are important for the proposed model, they are described as follows:

11.3.1 Bivariate Fit

This is the simplest relationship and, as its name implies, links two domains (or strategic components) which are adjacent in a multi-domain strategic model. The vertical bivariate fit in this model is termed strategic fit and is internal at the level of infrastructure and processes and external at the level of strategy. In this dimension the relationships represent the classic strategy formulation and implementation perspectives. In other words the linkage represents the enactment of strategy. The horizontal bivariate fit is termed functional integration and represents the linkage between the business domain and

the technological domain. The advantage of the bivariate fit relationship is its essential simplicity. It is suggested that this type of relationship alone may suffice to describe inter-strategy relationships in simple or basic cases, although bivariate relationships between multiple strategic components can create a reductionist (i.e. not holistic) model (Venkatraman *et al.* 1993). This could cause the logic of the model to break down through internal logical inconsistencies.

11.3.2 Cross-domain Perspectives

The problem of reductionism is improved by recognising multivariate relationships (i.e. cross-domain perspectives). SAM conceptualises this type of relationship as having three domains (i.e. strategic components) that are linked sequentially. The most significant aspect of cross-domain perspectives is the recognition of the inter-relationship of strategies in the different domains in allowing a strategic view of the model to be formed (Luftman 1995). In other words the model is based on the assumption that the linkages are not exclusively top-down or bottom-up but that each component of the model can have a transforming effect upon another strategy or infrastructure in another domain, whilst being anchored by the component in its own domain. There will be a number of cross-domain perspectives (technically eight for a four-component model) which have different purposes according to the use of the model. The relationship that allows this to be proved with some degree of confidence is triangulation (Jick 1983), which has been used to manage multi-dimensional relationships in other types of modelling, such as user requirements representation (Kaulio and Karlsson 1998). It is suggested that the cross-domain perspective concept is an improvement on bivariate fit in terms of its ability to integrate across domains. Henderson and Venkatraman suggest that 'the effectiveness...will be significantly greater for any cross-domain perspective than for any bivariate fit relationships' (Henderson and Venkatraman 1994).

11.3.3 Strategic Alignment

The third type of modelling relationship is strategic alignment. In the context of a strategic linkage model, strategic alignment can be conceptualised as 'weak' single loop transformation process and a strong double loop process (Argyris and Schon 1979). A loop (single or double) implies complete alignment of the whole model, but the former implies 'one single direction of transformation, whereas the latter recognises...both possible directions' (Henderson and Venkatraman 1994). Strategic alignment is based on two theoretical concepts: completeness and validity (see Figure 11.1). Completeness implies that a single cross-domain alignment exercise is not sufficient to allow the linkages in the whole of the model to be taken as given or fixed. Further, each of the four cross-domain alignment triangles that are possible in a model having four domains is incomplete.

In this view the cross-domain perspective offers only partial completion and is unidirectional, while true strategic alignment implies a single loop transformational linkage. Validity refers to the extent to which the threat of bias in the model can be overcome, which should involve challenging and analysing all the given (i.e. anchored) relationships in the model from as many perspectives as possible (Henderson and Siphonis 1988).

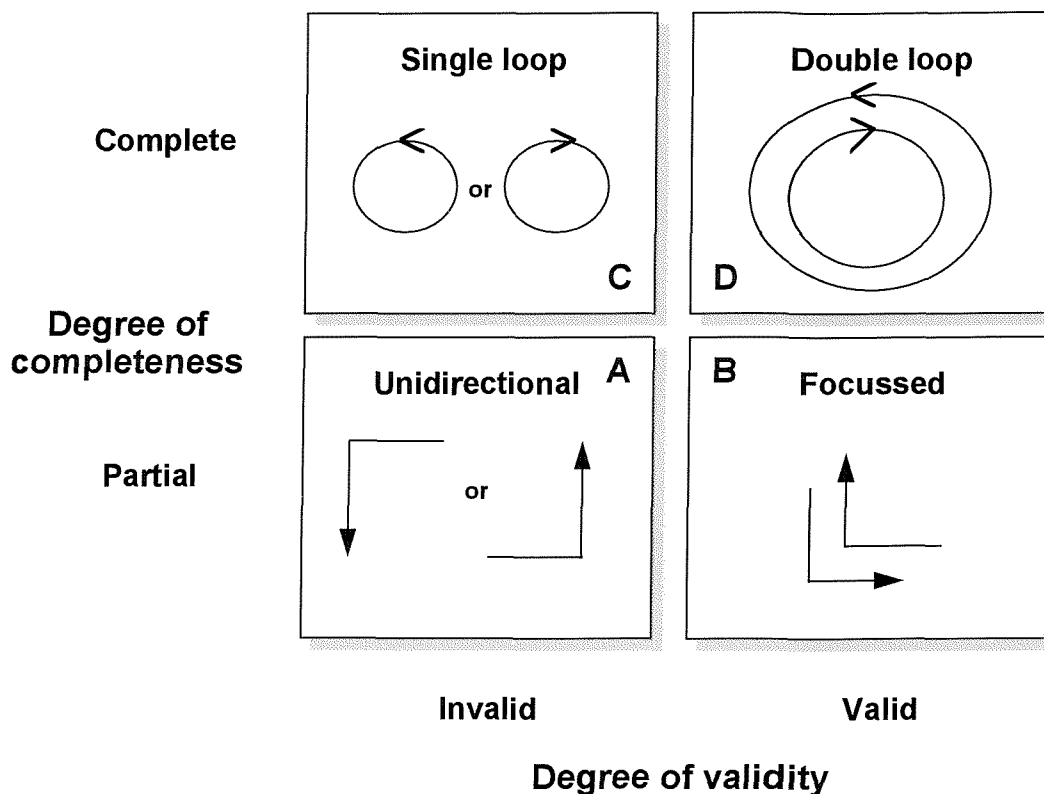


Figure 11.1 Principles of Alignment (Henderson and Venkatraman 1994)

In practice this means that the linkages should be focused from both directions of the relationship. A focused relationship is held to be more valid than a unidirectional one, and a double loop model has the greatest degree of completeness and validity (Argyris 1982). This leads to the proposition that full alignment is more complete and valid than any type of relationship involving a cross-domain perspective or bivariate fit between the components and the proposed linking method is based on a model which aims to achieve full alignment, as described in the next section.

11.4 The Strategic Linkage Process (SLIP)

The process of linking the business strategy to the development of strategic IS/IT applications is characterised by several factors which are similar to the process which

applies to the development of information systems or applications software. First, both types of process involve tasks involve dependency. In other words, they must follow a particular sequence which is dictated by the relationship between the inputs and deliverables from individual tasks and, although some concurrency between tasks is possible (Aoyama 1997), it is rarely possible to operate massive parallelism in the execution of such tasks. Second, both are constrained by the availability of resources. which can be deployed in its execution and the consequence is that process life cycles are usually defined in terms of time and sequence. It is possible to identify several such life cycles that may apply to SLIP:

- **The ‘linear-sequential’ model** or waterfall model (Pressman 1997) involves the definition of tasks and milestones that are sequential stages in the process. Completion of one stage to a pre-defined extent is a necessary prerequisite to the commencement of the dependent or succeeding stages (Rumbaugh 1992). Although this model has been questioned (e.g. Boehm 1996) and improved (e.g. Lott 1997), it continues to be a commonly-accepted process model, particularly when modified to include whirlpools which suggest that individual stages can be iterated rather than frozen at completion’ (Tsai *et al.* 1997);
- **The helical-spiral model** (e.g. Ainger and Schmid 1995, Boehm 1988) implies that the whole model is iterative and is subject to incremental cycles of improvement at the end of which the process reaches a further stage of completion or moves towards a desired goal. This model is used to describe the Strategic Alignment Process or SAP (e.g. Henderson and Venkatraman 1993, Macdonald 1991) which has a number of similarities to the SLIP model. It has already been observed that there are similarities between the proposed SLIM and the Strategic Alignment Model or SAM (Henderson and Venkatraman 1991) which make the SAM/SAP model a sound analogy and a firm basis for the proposed SLIM/SLIP model;
- **The incremental model** is a combination of the linear-sequential and helical-spiral models (McDermid and Rook 1993). The difference is that the process is viewed as a number of increments, each carried out as a separate linear sequence, in parallel or one after another, each increment producing a specified deliverable as in the RAD approach (Martin 1991). The model has features that make it suitable for the proposed method, but it is more suited to ‘building’ processes (e.g. systems development) than ‘tuning’ (i.e. strategic linking);
- **The component assembly model** (Nierstratz 1992) has some similarities to the incremental and spiral models and also has some points to recommend it, but its presupposition of a ‘construction and release’ approach implies that it is more suited to the software development process than to strategic linking.

This informal examination suggests that the helical-spiral model is the most appropriate for describing the strategic linking process in general. Specifically, a variant of the SAM/SAP modified to fit onto a helical-spiral model is chosen to support the proposed strategic linking method. SAM/SAP is obviously very suitable for supporting the strategic alignment component (and is chosen for this purpose), but it can also be extended to support the other three strategic linking components.

11.5 The proposed SLIM architecture

The proposed architecture for the strategic linking method is based on the work of the MIT 90s project (Henderson and Venkatraman 1991, Macdonald 1991). It recognises all three categories of inter-domain relationship that are described in the previous section and the theories behind these types of relationship are also described in that section. The characteristics of the proposed model (SLIM) are as follows:

11.5.1 Domains

The model has two domains, which bisect it vertically and horizontally. The vertical domains are termed aiming and manoeuvring and the horizontal domains are termed envisioning at the higher level and enacting at the lower level. The purpose of the model is to demonstrate the interaction between the domains. The strategic vision and strategic alignment components are linked in the aiming domain through their contribution to the establishing of organisational direction and organising the strategies and infrastructures to follow this direction. The position and flexibility components share the manoeuvring domain because they deal with the establishment of strategic space and the deployment of infrastructures and technological resources to maximise the use of this space. This aids the practitioner in understanding the functioning of the model and ensuring that the model is related to the corresponding domains in the real world organisation. It is important that the business and technological strategies and infrastructures are co-ordinated and marshalled to support the organisation's long-term strategic vision in aiming the organisation towards a desired future state. Equally, the identification of the positioning factors which will influence the organisation's ability to achieve its strategic vision requires a flexible infrastructure to cope with the possible range of strategic manoeuvres that it may wish to enact (D'Aveni 1994).

11.5.2 Drivers

The model has a separate set of drivers for each of the strategic components. The drivers are the forces that are external (to the model) which influence its components and their relationships. The strategic vision component is driven by long-term factors in the business environment such as structural changes in national and international industry,

macro-economic climates and trends and the initiatives and imagination of the strategy-setters. The strategic position component is driven by the shorter-term external factors that operate in its business environment, such as political and commercial alliances and the actions of competitors. The forces of this driver are broadly analogous to those of Porter's ICA model. Strategic flexibility is influenced by short-term changes in the business environment (i.e. legal, political, economical, social and technical changes) as well as changes in technological platforms and standards. These forces provide an arena within which future strategic positions may be assumed. In the longer term, the drivers of the strategic positioning component will influence this conceptual arena and will tend to expand or contract the space as flexibility becomes more or less important to a firm's or an industry's strategy. The drivers of the strategic alignment component are the short-term factors that influence the internal infrastructures (e.g. human resource management legislation and human resource availability), business processes and legal and micro-economic factors such as regulation and finance. This aspect of SLIM is useful in prompting the practitioner to examine the drivers in more detail before commencing the SLIP. This is a form of environmental scanning and identification of the factors is important in shaping the components and informing the subsequent linking process.

11.5.3 Linkages

The linkages in the proposed SLIM are the relationships between the various strategic components of the model. These relationships are intended to suggest the ways in which the components act upon one another. The relationship between the strategic vision and strategic positioning components (linking aiming and manoeuvring within the envisioning domain) represents the use of strategic vision in conjunction with intelligence from the business environment. This can envisage strategic potential (i.e. possible future positions or states of being) and mechanisms (i.e. possible future actions or developments) which can form a part of future business strategies. The relationship between the strategic positioning and strategic flexibility components linking envisioning and enacting within the manoeuvring domain represents the need to have flexible infrastructures and architectures which can cope with changes in business position and which will allow IS- and IT-based mechanisms to be developed to support strategic moves. The linkage between flexibility and strategic alignment (linking aiming and manoeuvring in the enacting domain) is based on enacting changes in strategies and infrastructures (e.g. through BPR and structural change) to consolidate the business strategies and infrastructures in line with possible strategic manoeuvres (D'Aveni 1994). The next linkage (linking envisioning and enacting within the aiming domain) is between strategic alignment and strategic vision. This represents both the constraints and the opportunities that impinge upon the consolidated

strategies and infrastructures in enabling the strategic vision and dictates the extent to which the strategic vision is realistic and achievable.

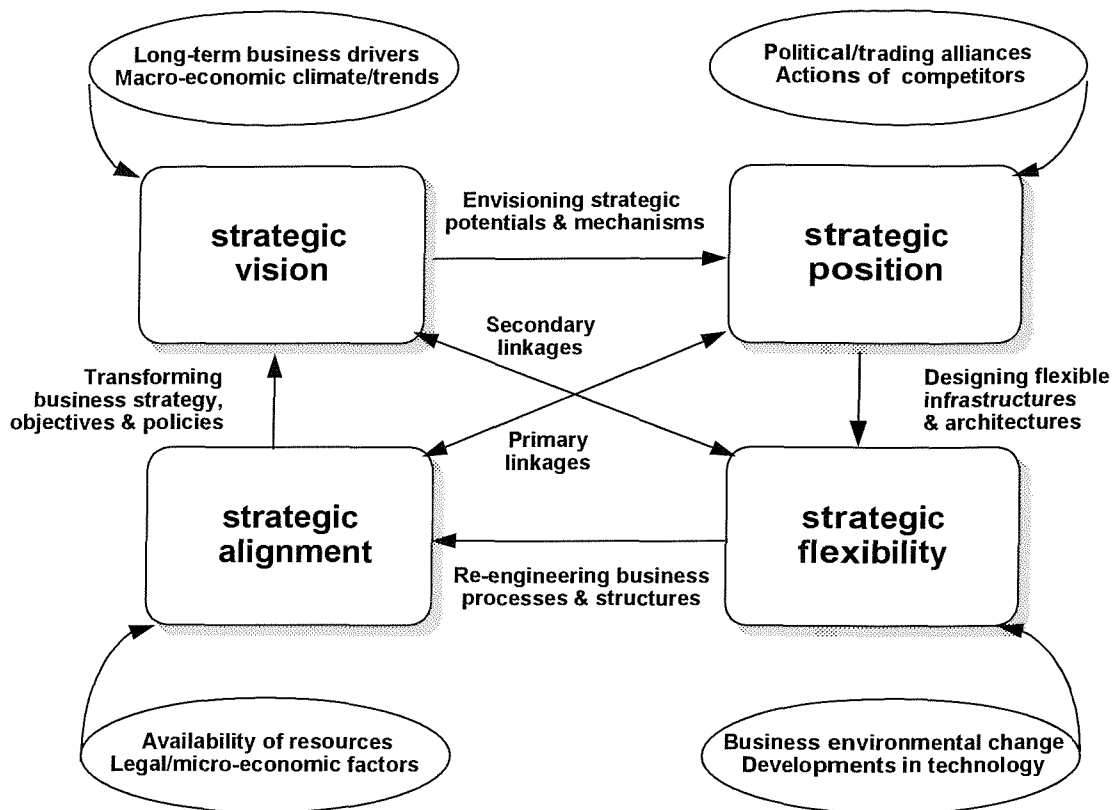


Figure 11.2 The Proposed Strategic Linkage Model (SLIM)

There are two remaining linkages. First, there is latitude, that links the components strategic vision and strategic flexibility, (i.e. effectively relating the envisioning and aiming domains to the enacting and manoeuvring domains). Second, there is focus, which links the strategic position and strategic alignment components, (i.e. effectively linking the envisioning and manoeuvring domains to the enacting and aiming domains). The first represents the room for manoeuvre that is afforded by the linkages between strategic vision and strategic position and strategic position and strategic flexibility. In other words, it implies that the organisation’s ability to develop alternative future strategies is enabled by its ability to envision strategic potentials. These are in turn supported by flexible infrastructures and architectures. The focus linkage represents the concentration on organising resources and processes in order to carry out a planned action or achieve a desired position in the market place. SLIM is held to be a sound architecture upon which to base the proposed SLIP method, as it is constructed on principles which are grounded in the work of the MIT 90s model (see Figure 11.2). It is now possible to suggest such a

strategic linking method that is rationalised and reconstructed for use in linking the development of business vision to the provision of flexible IS/IT infrastructures while recognising the effect on the business strategies.

11.6 The proposed SLIP method

It has been stated previously that the main difference between a model and a method is the inclusion of operational factors such timing and sequence. The proposed SLIP method is based on the helical-spiral model (Boehm *et al.* 1998). Although the iterative approach of SAP has no pre-defined start point and end-state, but terminates 'when it is clear that the effort involved in another cycle is not justified by the anticipated improvement or refinement' (Macdonald 1992). The proposed SLIP method can be regarded as a situational method that maps onto the strategic components of SLIM. The techniques that have been proposed to support the development of the strategic components (as described in Chapters 7 to 10) can be fitted to this framework as is appropriate to the application. The proposed structure of SLIP is as follows:

11.6.1 Stage 1 - Vision Development

In the initiating stage of SLIP it is proposed that the first stage of the Future Analysis technique (Land 1982) will be used to support the conception and interpretation of the vision and aid in declaring its intention. The inputs to the stage are the subjective intentions, wishes and beliefs of the top-level management in terms of the organisation's future. The stage of vision development seeks to be creative in expanding these subjective elements and applying them to a possible future scenario for the organisation. Future Analysis (Land 1982) is used to identify the changes that may impinge upon the organisation and the proposed strategic system over the time period under consideration.

This is supported by the ICA framework (Porter 1985) which is used to express the intention behind the vision by identifying the forces in the organisation's environment and the potential for action within it. It is proposed that a multi-disciplinary team, consisting of representatives of the executive body, business functional areas and IS/IT management function carries out this stage. The tasks contained within the stage are conception, interpretation and intention. The output from the stage will necessarily be flexible in format, but will most often express a future scenario which describes the future state of the organisation and its market and of the proposed strategic system and its role in the organisation's business activities. The main requirement of the deliverables is that they are meaningful to the stakeholders and are capable of being communicated and spread to the parts of the organisation which are effected by the vision.

11.6.2 Stage 2 - Strategy Promulgation

The strategy promulgation stage consists of the synthesis and integration tasks. Synthesis involves a conventional problem analysis exercise in that it seeks to identify the main problems in the expressed vision and stresses the participation and consensus aspects of agreeing the vision between the stakeholders. Integration is an important task in the promulgation stage in that it deals with communicating the expressed vision and its defined problem(s) and 'inspiring the participants [i.e. the stakeholders and those involved in the strategic system] to accept and follow the vision' (Avison *et al.* 1998). It was felt that none of the available methods was completely suitable for use in supporting this stage. However, the techniques that seemed to offer the most potential are those taken from SSM (Checkland 1988), namely the rich picture, the use of CATWOE criteria and the production of a root definition. These techniques are described in more detail in Section 9.6.4 and 9.6.5. The outputs from the strategy promulgation stage will represent some of the most important intangible values - a general agreement of the vision and an understanding of the need to bring about the vision.

11.6.2 Stage 2 - Environmental Scanning

The main task at this stage is to identify the forces and factors in the organisation's environment that will effect, and be effected by, the vision developed in the preceding stage, particularly in relation to the strategic use of IT. The tasks involved at this stage are to identify the impact of IS/IT on the business when used strategically and the forces that shape the strategic use of IS/IT in the organisation's market place. The method which is proposed for use at this stage is the strategic IT mapping technique (Parsons 1987). The output from the stage is a set of future-acting forces identifying and positioning the environmental forces in relation to the above factors.

11.6.3 Stage 3 - Sustainable Advantage Development

The previous stage deals with factors which are external to the organisation and which are concerned with equipping the organisation to achieve an advantage over its competitors. Establishing a competitive advantage is obviously important to its strategy, but the literature suggests that it is also important to sustain that advantage if the strategy is to be carried out in the long term. The purpose of this stage is therefore to suggest potential IS/IT mechanisms (i.e. strategic applications) which will support the business potentials in achieving and sustaining competitive advantage for the organisation for a sufficient time to allow the business vision to be realised. The phases within this proposed stage are competitor analysis and supply systems analysis. Competitor analysis includes the tasks of competitor identification, which involves identifying specific companies that are actual or potential rivals and competitor competence assessment, which seeks to identify the

distinctive competencies of these competitors. Porter's ICA model is proposed as the technique for supporting this activity. Supply systems analysis involves target group identification, potential IT applications identification and differentiating factor assessment. The proposed techniques to support these phases are: Wiseman's strategic options generator to identify the target group(s) of the strategic manoeuvre, Parsons' potential IT applications grid to suggest strategic applications and a modified version of Burch's SISP differentiation/feasibility ranking technique. The outcome from this activity is a ranked list of IS/IT applications that should achieve the desired strategic position.

11.6.4 Stage 4 - Flexibility Analysis

Once the candidate systems that will provide benefits in following the business vision are identified, will be necessary to check that the IS/IT infrastructure is sufficiently flexible (Avison *et al.* 1995). This is important in ensuring that the advantages that are expected from the application will be achieved for as long as possible and that the unwanted costs and side effects of unpredicted changes will be minimised. The chosen method for achieving this (as described in Chapter 8) has two parts: first, Evans' framework for strategic flexibility (Evans 1991) is intended to pre-define offensive and defensive manoeuvres and identify probable triggering events.

This outcome from this is that the list of applications from Stage 3 can be compared subjectively with the manoeuvres and events identified at Stage 4 in terms of the ability of the applications to support the preferred manoeuvres and to cope with the events. This can lead to the rejection of the proposed applications or their modification by repeating all or part of Stage 3. This revised list is extended by the use of Silk's benefit-level matrix to map the revised application list onto the expected levels of benefit (i.e. efficiency, effectiveness and competition) in terms of the role of the applications in the organisation's strategic process (i.e. operational, tactical or strategic). Future developments and changes are identified subjectively and indicated on the matrix in a way that shows the future requirements of the systems. The third phase of flexibility analysis is to map the results of the benefit-level matrix onto the existing IT infrastructure and IS application portfolio to estimate subjectively the extent to which the latter can support the former.

This will produce a list of suggested changes that may have important implications for the organisation's business and technical strategies and infrastructures. The impact of these revisions on the strategic components may be assessed by using the outcomes from this stage (i.e. the list of proposed IS/IT applications and their objectives for future development) as inputs to Stage 5 Strategic Alignment.

11.6.5 Stage 5 - Strategic Alignment

Once the recommended strategic IS/IT applications have been identified and their benefits have been categorised, it is necessary to detail the changes which the proposals will make to the IT strategy and business strategy and to the infrastructures which support these strategies. The strategic alignment stage is concerned with achieving a match between the capabilities and potentials of these strategic components and ensuring that there is cohesion between them. SAM/SAP is the technique that is selected for the strategic alignment stage of the proposed linking method.

The overall SAP involves a series of stages progressively cycling around the Strategic Alignment Model, each stage aiming to achieve a degree of alignment within a value or potential triangle. Alignment between the strategic components (i.e. strategies and infrastructures) is achieved gradually as a result of meetings involving strategy-setters and managers from the functional areas that the components represent, an experienced process consultant and facilitator and excellent secretarial support.

In most cases this represents the IT and IS management and human resources management functions. Experienced users of SAP recommend starting with 'an orientation session in the form of a general discussion...and a presentation and debate covering general environmental information relating to the industry or industries within which the organisation operates' (Macdonald 1992). A number of cycles around the model are envisaged, with the iteration process taking less time as the participants become increasingly familiar with the process and with the application. The planned cycles are as follows:

- **Cycle 1 Phase 1** - termed the competitive potential triangle, this formation has the objective (in the context of the proposed linking framework) of confirming (or otherwise) the validity of the business strategy, identifying any obvious shortfalls in the IT strategy and highlighting unexploited IT potential. The step is also used to assess the need to reorganise, recruit or retrain the workforce to support the new strategy. There are obvious links between this stage and stages 1 and 2 of the proposed SLIP method;
- **Cycle 1 Phase 2** - a set of relationships that is called business value. The purpose of this phase is to fit the requirements from the competitive potential stage to the organisational infrastructure and processes. This is done by considering the business transformations implied by the changes to the strategies (Macdonald 1992) and to assess the fit of the IS provision to the organisation's organisational infrastructure and processes and to identify the need for change;

- **Cycle 1 Phase 3** - called the service level triangle, the aim of this phase is to establish the fit between the existing IS provision and the improved organisational infrastructure and processes and to assess the implications of the change in terms of new IS developments. There are links between this stage and Stage 3 of the SLIP method;
- **Cycle 1 Phase 4** – is the part of the cycle that aims to improve technology potential and is the last part of the first cycle. The aim in using it is to achieve alignment between the required IS infrastructure and processes and the amended IT strategy and to establish what limitations and problems will need to be addressed during the second SAP cycle;
- **Cycle 2 Phase 1** – is the review of an application's competitive potential. The purpose of this first replay phase is to review the modified business strategy (i.e. vision and strategic position) against the new inputs from the technology potential stage and to examine the outputs from the competitive potential stage of the first cycle. The finer tuning of the second cycle involves the participants in designing a suitable monitoring process for the new strategies and reaching agreement on their success criteria;
- **Cycle 2 Phase 2** - the purpose of the business value review is to resolve any issues from the previous phase, to update the organisational infrastructures and processes and to confirm that any recommended changes in these areas can be implemented. This is based on feedback from the change processes and the outputs from the corresponding phase on the previous cycle. In this phase it is important to develop the appropriate monitoring and control systems and to identify the effects of the proposed updates to the organisational infrastructure on the value systems of those within the firm;
- **Cycle 2 Phase 3** - is the review of the firm's service level. Here, the updated IS infrastructure and processes is reviewed and documented in its improved form. There will also be an assessment of the risks from the previous technology potential stage (i.e. cycle 1 phase 4) the new strategic IT potential needs must be assessed, particularly preparing to estimate the impact on the IT strategy and the IS applications portfolio;
- **Cycle 2 Phase 4** - the technology potential review is the final process stage of the second iteration, which is generally felt to be the minimum number of cycles to form an effective process (Macdonald 1991). In this activity, the outputs from the foregoing service level phases (i.e. process and review) are checked against an analysis of technology potential to ensure that the performance of the planned IT platforms and implementations is consistent with the objectives of the organisation's IT strategy (see Figure 10.4).

The model has been adapted and extended to include the concept of fusion (Papp and Luftman 1995) which is based on research which validates the existing eight perspectives and goes on to provide an additional type of alignment. Several of these additional types (e.g. organisation/strategy fusion and IT strategy fusion) were found to be relatively common in practice, and are interesting from an academic viewpoint. However, the recommended ways of achieving the extra categories of alignment (Papp 1995) are not considered to fit into the SLIP model and are not included in this stage of the proposed strategic linking framework.

11.7 Vectoring in the SLIM/SLIP Method

An overview of the proposed SLIP method is shown in Figure 11.3. It is important to note two particular features that have important implications for the use of the method, namely the use of vectors and the degree of focus.

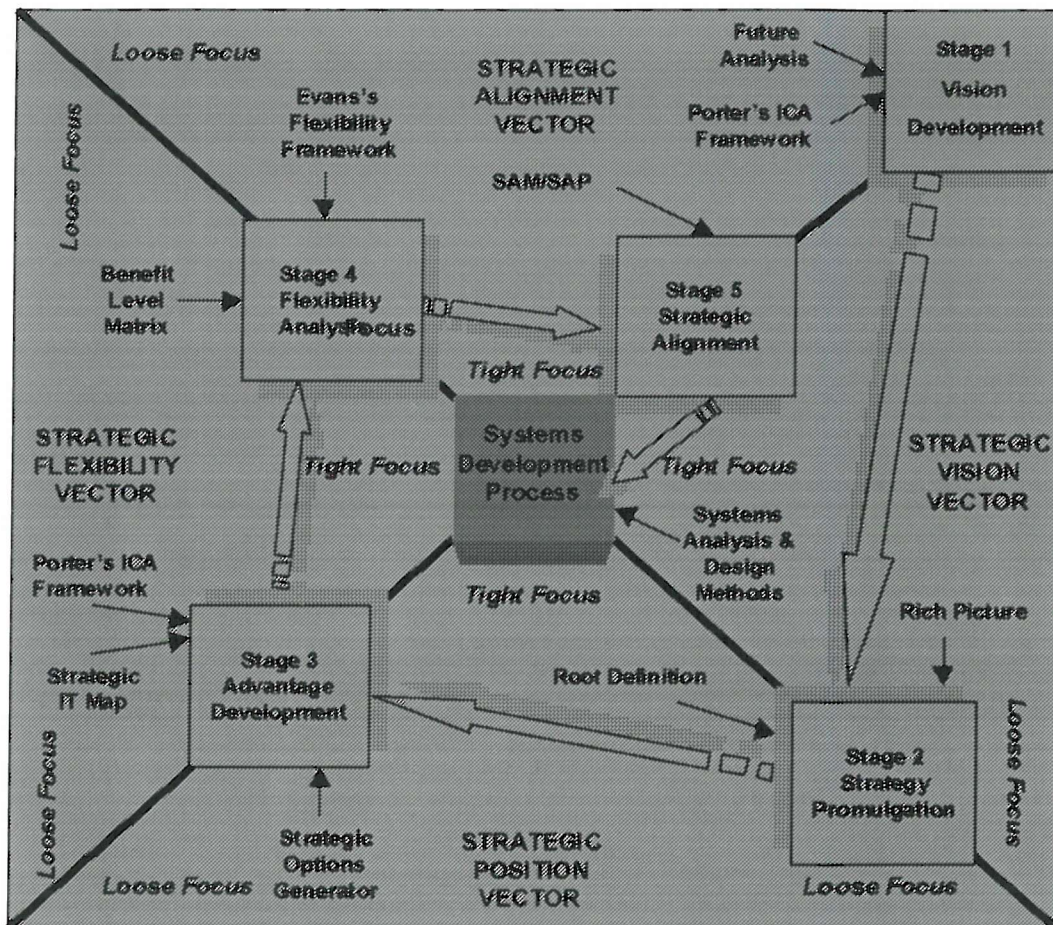


Figure 11.3 The Proposed Strategic Linking Process (SLIP)

The diagram (Figure 11.3) is divided into four triangular segments called vectors (or sources of influence) corresponding to each of the strategic linking components (i.e. strategic positioning, strategic flexibility, strategic vision and strategic alignment) that are described in chapters 7, 8, 9 and 10. It will be noted that the stages of SLIP are positioned on the boundaries of the vectors (e.g. vision development is on the boundary of strategic alignment and strategic vision). This indicates that the stage is intended to 'bridge' these two strategic components by addressing issues that are included in both components. The way in which these issues are addressed is described in more detail in the following section. In addition, the diagram represents the role of the linking stages in the process of reification (i.e. converting the abstract to the concrete) that links the creation of the business vision to the systems development process. This is represented in the diagram by the indicating 'loose focus' at the perimeter of the diagram and 'tight focus' at the centre (see Section 11.8).

The five linking stages are therefore shown as moving in a spiral (towards the centre of the diagram) as the degree of focus increases. It will be noted that Stage 1 Vision Development and Stage 5 Strategic Alignment both bridge the strategic alignment and strategic vision vectors. This implies that the beginning of the process involves developing a vision that will seek to achieve strategic alignment, and the final stage (before the systems development process can begin) is to 'close the loop' by checking the relationship between the developed vision and the current alignment state. The working of the process is described in detail in the following section:

- **Stage 1 Vision Development** - this stage spans the strategic alignment vector in the diagram, as it requires input from the current state of strategic alignment within the organisation moves towards the strategic position vector by developing a vision of a future scenario based on a planned business strategy;
- **Stage 2 Strategy Promulgation** - this stage bridges the strategic vision and strategic position vectors by making the strategic vision explicit and extending the strategy into all the necessary parts of the organisation. The output from this stage will indicate allow the identification of desirable positions within the firm's market place which are likely to allow the strategic vision to be achieved;
- **Stage 3 Advantage Development** - this stage takes its input from the 'strategic position' vector and links it to the strategic flexibility component by selecting and enacting the desired strategic position in a way which will sustain a satisfactory level of competitive advantage for the firm;
- **Stage 4 Flexibility Analysis** - this stage seeks to span the strategic flexibility vector by linking the output from the Advantage Development activity (i.e. the potential IT applications which will achieve a desired strategic position) to the organisation's

functional and technical strategies and infrastructures. This ensures that the sustainability of the business advantage will be matched by the durability and versatility of the technology;

- **Stage 5 Strategic Alignment** - this stage completes SLIP by spanning the strategic alignment vector and, in the model, returns to the strategic vision vector by providing the input to the system development process. This marks the end of the use of the SLIP method and the beginning of the application of a conventional systems analysis and design method to the development of the strategic IT application. As the strategic system operates in the business arena it will effect the balance of the alignment of the organisation's strategies and infrastructures.

The relative effectiveness of the strategic IT applications and the functioning of the alignment process will have two effects on the business strategy. First, it may restrict the business vision by recognising the real world constraints which are imposed by the IT strategy and IS infrastructure. Second, the scope of the strategic vision may be expanded by the superior competitive position and enhanced strategic flexibility.

11.8 Focus in the SLIM/SLIP Method

The other feature of the model is reification, or an increase in focus as the process progresses. The perimeter of the model represents activities which are fuzzy (i.e. undefined or imprecise) in terms of their objectives, scope and deliverables (Powell 1994). It is this feature which gives the method its spiral configuration. The initial vision development stage is relatively unfocussed and generalised and is therefore positioned in its vector to the outside of the diagram. As each of the subsequent stages is carried out, the requirements in terms of degree of precision and accuracy increases. Therefore the focus is tighter, culminating in the system development activity that is not, strictly speaking, a stage of the SLIM/SLIP method, but which represents the totality of the systems analysis and design activities that follow on from the use of the proposed strategic linking method. The system development stage of the diagram also includes the activities related to the auditing and performance evaluation of the operational strategic system. This is central in the diagram because it is the most focussed type of activity and all vectors of the model (i.e. strategic vision, strategic positioning, strategic flexibility and strategic alignment) are represented equally.

11.9 Application of the SLIM/SLIP Method

A single application of the strategic linking process (i.e. one cycle of the SLIM/SLIP model) can result in one of two possible outcomes. First, it may be decided that the outcomes of the process (i.e. an updated and aligned IT strategy and IS applications

portfolio) are satisfactory and the development of strategic systems proceeds in a routine manner with the application of conventional systems development methods. In this case the performance of the strategic IS/IT applications in supporting the business strategy will be monitored, and its effects on the organisation's strategic vision (both constraining and enhancing) will be noted. This outcome implies a further link between the system development activity and the Vision Development stage of SLIP as system's performance and potential causes changes in the business vision. Enacting this link would trigger the start of another SLIP process at some time in the future and the Strategic Alignment stage is the mechanism by which this would be enacted. Second, the outcomes of SLIP may not be satisfactory to the strategic managers of the organisation (i.e. the IT strategy and candidate IS applications) are not satisfactory.

In this case, the cause of the dissatisfaction must be examined and its nature identified. If the cause is a lack of alignment between the functional and technical strategies and infrastructures and the degree of misalignment is not too severe then the strategic alignment stage should be repeated until strategic alignment is restored (see Chapter 10). If, however, the cause of the misalignment is a major change in the business vision, then it is important that the system development activity does not proceed until the input from the new business vision is restored. This situation would involve another cycle of the SLIP process until a satisfactory degree of strategic alignment could be achieved by normal application of the Strategic Alignment stage. In theory, in the face of a rapidly changing vision of the business, this cyclical process could be repeated indefinitely, but in practice the cost (in cost, time and human resources) should restrict the number of iterations of the method. Pressure to carry out an excessive number of iterations could indicate that there is something wrong with the organisation's strategic management processes, which should be rectified quickly.

11.10 Summary

In this chapter the properties and requirements for a strategic linking method have been examined and a model and process for the linking the components of strategy to the system development process has been suggested. This is framed in the form of a five-stage method called SLIM/SLIP. The stages of the method and the techniques that support the stages are described in this chapter, and a diagrammatic model is used to explain the spiral nature of the method in terms of the concepts of strategic vectors and focus. To complete the thesis, the viability and validity of the proposed method needs to be established, and this is the function of the next and final chapter. In this a small sample of the survey population (see Chapter 6) is used to validate the SLIM/SLIP method by using a quasi-field study to solicit the informed opinions of practitioners who have

experience in developing strategic IS/IT applications. This enables a critical evaluation of the SLIM/SLIP method, and of the research work as a whole, to take place. These important topics are the subjects of the following chapter.

Chapter 12

Validation of the Proposed Linking Method

This, the final chapter of the work, is intended to bring together a number of themes. First, in Chapter 6 a number of hypotheses were put forward which allow some research questions to be answered. These hypotheses were tested with a postal survey of a population taken from a list of the thousand most successful UK companies. The results of this survey confirmed that four components of the linkage between business strategy generation and the development of strategic IS/IT applications (i.e. strategic positioning, strategic vision, strategic flexibility and strategic cohesion or alignment) are important to practitioners in the strategic IS/IT domain.

While the respondents to the survey are in agreement that these components were important considerations in developing their organisations' strategic systems, there was a notable lack of agreement among the responses on the use of techniques to ensure that the components were included in the development of the systems. It was necessary to ascertain the reason for this relative lack of technical support for the linking process. A literature search in the areas of each of the strategic linking components showed that there is in fact no lack of potential support techniques in the business and IS domains. It was found that many of the techniques and frameworks that appeared to offer potential in this respect had been developed for use in other applications (e.g. business idea generation, problem-solving or product portfolio management). They had, in many cases, been published over a decade ago but had never been taken up by practitioners or passed into the public domain in a way which might benefit the process of developing strategic IS/IT applications.

12.1 The Field Study Approach

The selection of the most appropriate supporting techniques (see Chapters 7, 8, 9 and 10) resulted in a model and a process that form the basis of a proposed strategic linking method called SLIM/SLIP, which is the main objective of the research, and which is described in Chapter 11. This method must now be validated and evaluated critically. It was pointed out in Chapter 2 that validation could be carried out in practice by introducing the method to practitioners in organisations and carrying out action research during the application of the method (Zuber-Skerritt 1991) or case study research by documenting the experiences of its users (Gabel 1995). It was stressed that this is clearly impractical given the scope and scale of the strategic systems development process, particularly if the conclusions are to be generalised by using a sufficient number of cases from different industry sectors.

It was indicated in Chapter 2 that the Grounded Theory approach had been considered as a candidate technique for use in validation. However, its unsuitability for inclusion in a part of a research programme based on combined methods led to it being ruled out. It is therefore necessary to adopt a scalable, flexible research method that can be adapted to the specific requirements of the validation process. It is apparent that the GT approach contains features that have much to recommend them for use in the validation process, specifically the following points:

- The use of structured categories ('seed categories' and 'core categories') to support the researcher in developing logical questions and refining the questioning process;
- The use of 'coding' or qualitative data analysis to structure the data into comparative categories that allow the important issues to be identified and developed in practice.

It is apparent that these useful features are independent of the overall GT approach, and that they can be incorporated in their own right into a suitable quasi-field study method. The development of this method and its use in validating the proposed strategic linking method is the subject of this chapter. In the spirit of the maxim 'if a tool does not exist, one must be invented', A decision was made to construct a quasi-field study approach based on the data gathering and data analysis stages of the GT method. The method on which the quasi-field study is based includes a distinct set of activities, as follows:

12.1.1 Identification of Survey Population

First, it was necessary to decide on a sample of respondents to interview. To initiate the validation process it was decided to carry out interviews with a sample of those respondents to the postal survey who had indicated a willingness to participate in further research. All of the possible subject cases have been filtered by the initial sampling exercise described in Chapter 6, so any sample taken for validation must be representative of the initial population. The problem here is therefore to choose a sample which is small enough to allow a sufficient degree of detail to be captured by the field study but which is large enough to be valid (Strauss and Corbin 1990). It is obviously undesirable to include too many cases as this approach may compromise the depth of the investigation by limiting the richness of the data to that which may be obtained from a survey rather than a field study (Miles and Huberman 1984).

12.1.2 Construction of Questionnaire

In a similar manner to the data gathering activities of the GT approach, the chosen quasi-field study method uses a two-stage questioning approach. First, it begins with the construction of sets of 'illustrative' questions that are based on the researcher's prior

experience and knowledge accumulated during the research exercise. The purpose of the illustrative questions is to prompt the researcher in gathering together a basic level of knowledge that will subsequently refine and direct the questioning process to more specific ends (Baskerville and Pries-Heje 1995). Therefore the illustrative categories of question are intended to test the practitioners' experiences and opinions of the strategic linking process against the researcher's assumptions about the use of the method (Miles and Huberman 1984). Second, as the common or important issues relating to the practitioners' experience and opinions emerge from the analysis of the illustrative questions (see Section 12.1.3), it should be possible to combine or integrate categories into higher level constructs. Some of these reorganised categories will emerge as 'refined' categories, which are central to the development of the theory or theories about the use of the proposed method. These consolidated issues are represented in the form of integrating statements called analytical memos (Strauss and Corbin 1997).

12.1.3 Comparative Analysis of Data

Even with the use of prompting questions in illustrative categories to structure the analysis, the practitioners' experiences are likely to be so varied and complex as to make rational analysis difficult. The data contained in the answers must therefore be refined into categories to allow the important issues to be identified. This process is known as coding, and a process of coding refinement as suggested by Corbin and Strauss (1990) is felt to be suitable for this application. The process begins with an 'open' coding exercise, in which the concepts contained in the data are labelled and grouped into illustrative categories, followed by an 'axial' coding exercise in which relationships between the categories are identified and explored to the required stage of refinement.

12.1.4 Theory construction

One purpose of a theory is to allow the findings from one research exercise to be generalised so that the results will apply to other situations having similar properties. In the case of the present research, it is intended that the experiences and opinions of the practitioners will be analysed and refined to form theories that will aid the strategic linking process in other organisations in the future. On paper the quasi-field study method appeared to have the potential to be successful, particularly since it is constructed using some of the data gathering and data analysis techniques that have been used in the GT approach. These techniques have been successful in both quantitative research (e.g. Boughn and Lentini 1999), and qualitative research (e.g. Hughes and Wood-Harper 1999, Star 1998). The process of validation using the quasi-field study approach is described in detail in the following section.

12.2 The Choice of Subjects

As was indicated in Section 12.1.1 the choice of the sample population is a crucial decision in any type of field study, as too few subjects can compromise the validity of the exercise and too many can compromise the depth of analysis. Obviously there can be no 'hard and fast' rule in choosing the number of cases, but experience in similar applications offers useful guidance. Eisenhardt (1989) suggests that less than four cases may make it difficult to generate the necessary complexity with an unconvincing empirical grounding, but a sample containing more than ten cases may make it difficult to draw detailed conclusions from the complexity and volume of data. With such small values, random sampling is not appropriate, and a purposive sampling strategy is recommended (e.g. Mason and Bramble 1989, Pettigrew 1990) to provide a lens to focus on or magnify the aspects of the research topic which are of particular interest or relevance. Marshall and Rossman (1995) suggest a pragmatic set of criteria for small-sample selection.

Included in these criteria are two recommendations that are relevant to the validation of the current research. First, the interviewer must be able to gain authorised access to the correct person in the participating company for a sufficient length of time to obtain the necessary data. In the case of this research project the respondent is particularly important, as he or she will need to have knowledge and experience of the strategy and systems development processes in the organisation. This is partly ensured by the fact that the respondents to the original mail survey were asked to indicate their willingness to take part in a further personal interviews, and it was possible to select the sample from those giving positive responses to this question. It was also requested that the questionnaires should be directed if necessary to the most suitable respondent, but it was recognised that one individual may not possess the relevant information, so it was decided to interview more than one person in some of the chosen organisations. Second, the cases that are chosen for in-depth interviewing should give sufficient data to address the research questions adequately. This criterion was met by selecting the sample from those companies that had provided particularly full or interesting responses to the original survey, on the principal that the respondents would also be prepared to give richer information in an interview.

Applying these criteria to the responses to the postal survey produced a 'follow-up' sample of six cases, five of which had asked for anonymity (i.e. of their organisations) to be maintained. Contacting the organisations again some six months after the survey revealed that one of the respondents was now working in America and would not be returning to the UK in the foreseeable future. Another of the original participants was working on a special project and was not able to fit into the time frame of the research.

The possible sample for conducting the validating interviews was therefore restricted to six organisations, which is the minimum number for this type of activity that will give reliable results according to Eisenhardt (1989). This left the issue of identification. Five of the six respondent companies had agreed to take part in the original survey on the condition that their companies should not be identified, and four of the individuals concerned had asked to remain personally anonymous. This was not unexpected because of the competitive nature of the research domain and the sensitivity of the strategic issues that are involved. Possibly due to these factors, upon being informed that the other five organisations had stipulated anonymity, the respondent who had initially agreed to the disclosure of the company's identity then asked for it to be kept secret.

Although it was felt that a complete identification of the participating organisations would be of interest to the research community, the purpose of the follow-up survey is not to develop case studies to add to the literature or to give a detailed analysis of industrial practice. It is to validate SLIM/SLIP by offering it for comparison with practitioners' experience in a variety of organisations. In this context, therefore, revealing the identity of the organisations is less important to the research than ensuring that their distinguishing characteristics (e.g. size, management structure, industrial sector, experience with IS/IT etc.) should not be too concentrated or repeated within the sample frame.

As it happened, the six organisations were all in different industry sectors (see Figure 12.1) and were of widely different sizes as measured by turnover and number of employees. Although all of the companies had developed at least one strategic IS/IT application, their organisational experience of the strategic use of IS/IT (i.e. the length of time each had operated a strategic application) also varied from over ten years to less than a year. It was therefore felt that if the proposed SLIM/SLIP method was valid in the opinion of the members of the follow-up sample, the result could be generalised to a range of organisations of different sizes and distinguishing characteristics, which would mean that the method would be useful in practice.

12.3 Background Information on Participants

The details of the organisations in which the personal interviews took place are summarised in Figure 12.1. As was mentioned in section 12.2 it was necessary to disguise the identity of the organisations taking part. This does not interfere with the findings from the interviews, although the resulting information was examined to ensure that none of the participants could be identified from facts contained in the data. Company A operates in the ceramics industry and is 'divisionalised', with a central IT department that concentrates its management effort on the core DP systems. Functional departments in this organisation have a considerable influence on IS/IT strategy.

Co	Business Sector	Response Details	Strategic IS/IT Application(s)	Participated in System Development Activities					
				1	2	3	4	5	6
A	Ceramics Manufacture and Distribution	Logistics Director, Logistics Division	- Inventory/supply IS - DP 'core' system - EIS/DSS 'Transformation' IS	✓	✗	✗	✗	✗	✗
B	Banking and Finance	Senior Executive, Strategy	- IOS sharing data or expertise with allies - DP 'core' system	✗	✗	✗	✓		✓
C	Unit Trust Investment	Chief Executive	- DP 'core' system - EIS/DSS 'Transformation' IS	✓	✓	✓	✓	✓	✓
D	International Airline	Systems Architecture Manager	- Inventory/supply IS - DP 'core' system	✓	✓	✗	✓	✓	✓
E	Glass/glazing Manufacture & Distribution	Head of Group IS Services	- EDI system - Inventory/supply IS	✓	✓		✓	✓	✓
F	Chemicals Processing/ Distribution	Group IS Manager	- EIS/DSS 'Transformation' IS	✓	✓	✗	✓		✓

Key to table:

	Activity	Question in survey
Activity 1	Development of business strategy	5d
Activity 2	Identifying high-impact IS/IT applications	5e
Activity 3	Identifying the strategic potential of IS/IT	5f
Activity 4	Linking the business and IT strategies	5g
Activity 5	Linking the IS/IT strategies to the applications portfolio	5h
Activity 6	Identifying and planning the strategic benefits	5i
✓	= Respondent had taken part in the strategic linking activity	
✗	= Respondent had NOT taken part in the strategic linking activity	
	= Activity was not present in the strategic systems development	

Figure 12.1 The Organisations, Systems and the Experience of Participants

12.3.1 The Organisations and their Strategic Systems

The Board drove the development of the strategic application (with the assistance of consultants) after pressure from managers in several of the business functional areas. Four strategic IS/IT applications had been produced in this way. As a result, the respondent from this organisation (who was responsible for the most recent strategic development) was the Director of the Logistics Division. Company B is in the Banking and Finance sector and had developed a strategic application within the last year. In this organisation a top-level steering group is responsible for overall IS/IT strategy, but developments (including the recent strategic application) were initiated at the level of the strategic business unit. The respondent in this case is the senior executive responsible for strategy. Company C, a unit trust investment company, is a part of an investment conglomerate and had considerable autonomy as a strategic business unit. It regards IT as an integral part of its business competencies and has some ten years experience of the operation of strategic systems. Its most recent strategic system development was a decision support system (DSS) for its investment management team, which was initiated by the CEO and the Finance Director. The respondent, who had overall control of IS/IT strategy, is the CEO. Company D is an international airline which also views IT as an integral part of its business, but which operates a separate IS/IT division. It operates two applications that it considers as strategic: a seat-booking and ticket-issuing system and an inventory and supply system. The respondent in this case is the Systems Architecture Manager who represents the IT Division, the Director of which is responsible for driving both of these developments.

Company E is a manufacturer and distributor of glass products which is a part of a conglomerate, and which operates an IS Group which has responsibility for IS and IT strategy. This company had been operating a strategic inventory/supply system for several years when it became necessary to develop an EDI system to deal with its major customer base, and it sought to employ its expertise in the area to extend its EDI facilities upstream to include its suppliers. These developments had been driven by the head of Group IS, who is also the participant in the validation process. Company F is a part of a chemical processing and distribution group and drives its strategic systems development through its business functional areas. The organisation has operated a strategic decision support system for process planning and control for three years and has recently used IT to re-engineer its core business processes. It is represented by its Group IT Manager.

12.3.2 Participant Experience

In the survey that is described in Chapter 6 it was proposed that, based on the literature search described in Chapter 5, a set of activities formed a part of the process of linking

the business strategy to the development of strategic IS/IT applications. In preparing for the validation part of the research it was felt to be necessary to find out in which of the activities the participants had experience. This information is important, as a lack of experience could render the exercise invalid. The activities are described in detail Questions 5d to 5i and are applied to the respondents in Figure 12.1. The respondent from Company A had direct experience of participating in the development of the business strategy upon which his organisation's strategic IS/IT application was based.

The respondent from Company B, rather unexpectedly for a 'strategy' executive, had participated in the more technical linking activities (i.e. 4 and 5) and in identifying the strategic benefits that his organisation's system was intended to produce. The respondent from Company C, perhaps as befits an active Chief Executive, had participated in all six of the activities in which his organisation had participated. The representative of Company E also exhibited this experience profile, although this respondent was from a more technical background and performed a corresponding function. The respondent from Company D, the airline, had participated directly in all the activities except activity 3, which had not formed a part of the development process. The participant from Company F showed a broadly similar profile (the organisation had not undertaken activity 5), who also represented the technical function of his organisation. It is clear from this information that the participant group has the necessary experience of the activities that were used to link the business strategy to the development of strategic IS/IT applications in their organisations. The group is therefore suitably qualified to take part in the validation of the proposed linking method.

12.4 Validation Questions – Illustrative Categories

The need to balance the richness of the data from the field survey with its volume has already been mentioned. Although the validation process is based on personal interviews it is felt to be important to have a focus in terms of the research questions which are to be used at this stage. Eisenhardt (1989) talks of the need to define a precise set of research questions to guide the researcher and to provide comparability between cases, while maintaining a degree of flexibility or allowing change to take place as the field study progresses. This is featured in the definition of an initial set of categories including a set of illustrative questions which begin the interview process (Baskerville and Pries-Heje 1995), but which can be modified and developed in practice. The illustrative categories for the exercise were suggested by the researcher's interpretation of the survey findings (see Chapter 6). It was decided to record the interviews in the form of brief written notes, as the researcher is most comfortable with this method of data recording. The illustrative questions were made into an informal questionnaire to provide consistency, to act as an *aide memoir* during the interview sessions and to structure the presentation of the findings

in the next section. The illustrative questions should represent both the planned structure of the interviews and the items of major importance to the validation process and are described in the following section.

12.4.1 Illustrative Category 1: The Strategic Development Process

This illustrative category embraces the factors in the organisation that represent the background to the development of the strategic IS/IT application and include the drivers, enablers and inhibitors of the strategy development process (King and Teo 1994). The purpose of the category is to establish the factors that were included in the organisations' strategic linking process. The illustrative questions in this category are as follows:

- Was a desired future state or long-term aim promulgated before the development of the strategic system?
- Was the strategic IS/IT application developed in response to 'market forces' or to achieve a position in the market place?
- Is the organisation's environment subject to large and frequent changes?
- Does the organisation have a number of related functional strategies?

12.4.2 Illustrative Category 2: Activities in the Linkage Process

Earlier in the research it was postulated, based on the findings of the literature survey, that the strategic linking process in a typical organisation would consist of a series of activities. This illustrative category seeks to identify which of these activities were involved in the process by which the business strategy is linked to the development of the strategic system identified in its survey response. The questions are as follows:

- Was there a conscious effort to develop a business strategy and to communicate to the developers of the strategic IS/IT application?
- Were potential strategic or high impact applications identified in the IS/IT portfolio?
- Was the potential to use IS/IT to support the business strategy or opportunity identified and analysed?
- Was the development of the strategic IS/IT application linked formally to the organisation's business strategy and/or organisational infrastructure?
- Did the strategic system result from the management of the IS applications portfolio?
- Were strategic benefits to be achieved by the IS/IT application identified and analysed?

12.4.3 Illustrative Category 3: The Methods and Techniques

This illustrative category seeks to assess the participant's opinions on the support that was afforded to the strategic systems development process by the methods or techniques that are used in their organisations. If, in the opinion of the practitioners, the existing methods give adequate support to the strategic linking process, then there may be difficulty in

making a case for the use of SLIM/SLIP. The illustrative questions on this category were as follows:

- What methods or techniques were used to support the development tasks identified in the original survey and confirmed in Section 12.3.2?
- Did anyone on the development team have experience of the methods or techniques prior to attempting the linking process?
- Were the tasks suggested in the research instrument present in the organisation's strategic linking and development process?
- How successful were the methods or techniques in supporting the identified tasks?

12.4.4 Illustrative Category 4: The Proposed SLIM/SLIP Method

With the illustrative questions in this category it is intended to carry out a subjective evaluation of the probable effectiveness of the SLIM/SLIP method if it had been used by the same practitioners to support the same development tasks and linking components in the same organisation. This category contains questions that seek to capture the judgements of the experienced practitioners on the use of the proposed SLIM/SLIP in the context of the historical development of the strategic IS/IT application. In principal, this appears to breach several of the principals of research that are described in Chapter 2.

First, the validation process is subjective or judgmental and lacks several of the features of a true experiment (Campbell and Stanley 1963) which would give complete internal validity. Second, *prima facie* the process appears to lack external validity in that the opinions of a relatively small population cannot be generalised beyond the results of this particular study. It is contended, however, that these factors should not be overstated and do not, in any case, apply so much to the evaluation of a proposal as they would to an data gathering experiment or a statistical survey. Indeed, the only way to ensure complete internal and external validity of SLIM/SLIP would be to observe and record its use in practice several times in each of a number of representative organisations - each time under the same controlled conditions.

Clearly this is impractical because of the scope and scale of such an exercise. The illustrative questions are therefore as follows:

- Does the participant judge SLIM/SLIP to be 'learnable' and acceptably easy to understand by a typical practitioner in the subject firm?
- Does the participant believe that SLIM/SLIP would be effective in supporting each physical activity of the strategic linking process?

- Does the participant believe that the four frameworks within SLIM/SLIP would support the strategic linkage components (e.g. strategic vision, strategic positioning etc.) which were identified in the survey?
- Does the participant believe that SLIM/SLIP would provide any significant improvements over the linking techniques that were actually used?
- Would the participant(s) be prepared to use SLIM/SLIP in practice on a future strategic systems development?

The responses to these prompting questions was recorded in short hand form and transcribed into note form according to the different themes or topics that are perceived by the researcher. The next stage was to compare these themes and to analyse the data for common issues.

12.5 Comparative Analysis of Data

The participants' responses to the illustrative questions in the previously described categories were examined and cross-referenced. The first stage of comparative analysis is open coding, in which themes in the data are identified, correlated and combined into 'illustrative categories' based on common issues. It was possible to identify a series of common issues relating to the practitioners' experience and opinions of linking the organisation's business strategy and its strategic IS/IT application. These were then correlated and combined into new categories in an axial coding exercise. There was considerable scope for combining and integrating the data from the illustrative categories into analytical memos, in which the responses were recorded prior to being fitted into the following categories:

12.5.1 Common Issue 1: Links to the Business Strategy

This axial category links the illustrative categories 'strategic development process' (12.3.1) and 'activities in linkage process' (12.3.2) and contains the external issues that once led to the development of the strategic IS/IT application. It can be seen that the initiation of the strategic system development process varied widely in the sample. Analysis of the responses to the illustrative questions shows that the majority of the systems were developed in support of a long-term business aim or vision, and that difficulties were experienced in defining and communicating this aim within most of the organisations. Four of the six participating organisations had developed at least some of their strategic applications as a part of a long-term vision. Company A was unique in that the Board as a whole was responsible for initiating the development process, and the respondent indicated that difficulties in communicating the vision had resulted, in spite of the use of an external consultant to facilitate the process. Individuals or small 'focus

groups' lower down in the organisation initiated the other system developments. Commonly, it was felt that individuals were more able to conceive the ideas for the applications and to communicate them to others than were groups. Several of the participants offered the opinion (unprompted) that this phenomenon was due to the lack of a formal supporting technique for the vision process. Companies A and B (which also indicated that a group was responsible for the initiation) felt that they had performed poorly in this activity and anecdotal evidence supported this view.

There appeared to be little difference in effectiveness between the source of the vision. The applications of companies C and F were initiated by 'business people', and companies D and E by individuals from a technical background. Both groups rated the effectiveness of the process of communicating the business vision as 'satisfactory', although the respondents were unanimous in feeling that more technical guidance would have been welcome. All were describing their organisation's first experience of linking business strategy to a strategic IS/IT development. The indications of the effectiveness of technical or methodological support were less unanimous. Companies C and F had used recognised techniques, and felt that they had supported the vision process well and had improved the likelihood of success. Companies A, D and E had developed their own in house methods of envisioning and communication, and opinions of their success were more varied, although all the participants believed that the techniques could be improved in practice. Company B was the only one not to use a formal supporting technique and, significantly, the representative of this company felt that this had contributed to a poor performance in communicating the aims of the system.

12.5.2 Common Issue 2: Links to the IS/IT Infrastructures

This category contains responses that emerged during the axial coding phase relating to the internally focused or downstream issues that linked the IS or IT strategy and the strategic IS/IT application in the participating firm. These common issues concern the way IS and IT is managed and the perceived role of IS and IT in the organisation. The first of these common issues is the type of technology strategy that is in place. Company A had a strategic information systems plan and had developed this over a period of about five years. It did not, however, have a long-term plan for its IT infrastructure (or an IT strategy) which was developed in a piecemeal fashion. This company had a notably informal approach to IT management, as it also managed its applications portfolio and selected its strategic applications by 'rule of thumb'. The respondent commented on the difficulties which this created, as he believed it had restricted the organisation's ability to achieve the full strategic potential of its IS/IT applications and attributed the situation to the technologists' lack of understanding of the business issues. The drivers behind the use

of IT in Company A were the originally business functional areas, which had resulted in the responsibility for IS/IT management being placed within the Logistics Division. Company E presented a similar profile, in that it did not have a formal IT strategy (i.e. a plan for its IT infrastructure) but had a strong and well developed IS strategy, which was managed by the IS Division with representation at Main Board level.

In this company the IS Division was responsible for managing IT within the firm. Again, the difficulty which the technologists may have (or have had in the past) in understanding the business issues was cited as being the reason for the lack of a separate IT strategy managed by the staff with the highest level of technological expertise. Significantly, further investigations involving the people responsible for the technological issues in both companies A and E revealed that policies existed in both firms for deciding issues such as communications standards, processing platforms, vendor rating and outsourcing. It was felt that these companies did in fact have an IT strategy, but that it was not linked formally to the business and IS strategies. The Senior Executive of Company B claimed at first that his firm did not have an IS strategy. However, systems analysis personal in this firm described a form of applications portfolio management which probably forms an effective alternative, but which is not formally linked to the business strategy. Company B possessed a well established IT strategy and an equally effective approach to auditing the performance of IS/IT applications and selecting the most appropriate applications (including those with a strategic purpose).

When this was raised with the named representatives of these companies both individuals agreed that the approaches to IT and IS in their companies did, in fact, constitute a strategy. However, significant evidence of the linking process was lacking in both cases. Both respondents agreed that this should be remedied by developing an IT strategy and linking it to their other functional strategies. Companies C, D and F all exhibit a very similar profile in the way in which they managed their IS and IT strategies. The respondents claimed that their organisations had both IS and IT strategies and a means of linking them to the business strategy. All three also had a full set of strategic factors in the form of an applications portfolio management process and an in-house method for selecting strategic IS and IT projects. Companies C and D also used an in-house process for auditing the performance of its IS/IT applications.

12.5.3 Common Issue 3: Support for the Linkage Components

A very important common issue that emerged from the participants' responses to several of the illustrative categories (e.g. 12.2.2 'tasks involved in strategic linkage' and 12.2.3 'the use of methods and techniques') relates to the processes that support the components

of the strategic linking process. It is convenient to separate this common issue into themes that relate to the four strategic components that are described in chapters 7, 8, 9 and 10. The four parts of this common issue are therefore as follows:

- **Support for Strategic Vision**

This common issue includes the process that develops the strategic vision and promulgates it throughout the organisation. All of the participants felt that the articulation of the business vision (e.g. the aim of the current business strategy) could be better in their organisation. The representatives of organisations A, E and F spoke specifically of the 'gulf of understanding' of the business vision which appeared to exist between the executive body and middle management and/or between the business managers and the technologists. As Participant A put it, 'it is one thing to know where we want the organisation to be and what we want to do. It's a different and more difficult matter to explain it to our IT people so that they can make it happen'. Only the representatives of organisations B and C had experience of techniques to define and explain the business vision, and their purpose was to secure internal agreement of the vision among the executive body, rather than to communicate the vision to the systems or infrastructure developers. Participant D claimed to have undertaken a professional short course to secure a better understanding of the development of the business strategy, and to be disappointed at the lack of technical assistance that it offered;

- **Support for Strategic Positioning**

This common issue examines the extent to which the organisation's position in response to the strategic factors in its environment is known or understood within the organisation, particularly the initiators of the strategic IS/IT applications. The level of understanding of their organisation's position in relation to its competitive environment varied widely among the respondents. The representative of Company A felt that the development of this company's strategic application had been underpinned by a good understanding of its market. Companies B and C (both in the financial services sector) had also used an understanding of the competitive environment to inform the decisions which led to the development of the strategic system. All of the other respondents, however, felt that their companies had been poorly informed about their strategic position prior to the development of the system. Significantly, a belief that this factor was of great importance to the development process was common to all of the participants. Interestingly, the Systems and Data Architecture Manager of Company D voiced the opinion that the environmental scanning had improved his company's appreciation of threats to its strategic position and had enabled it to include features in the system (an inter-organisational MIS) that would allow its intended strategy to be achieved;

- **Support for Strategic Flexibility**

This issue concerns the extent to which the organisations' business environment is subject to change. The respondents' views of this factor were unanimous. All felt that the business environment in which their companies operated was increasingly subject to dramatic change. The Logistics Director of Company A spoke of the importance of changing economic factors (such as international exchange rates) to his company and indicated that this was a significant factor in driving the development of the strategic system. It was expected that Companies B and C would also indicate that this was an important factor, as both companies were in the banking and finance business sector. In both cases the influence of the strategic use of IT was identified as a cause of the market turbulence, as the introduction of programmed trading systems has apparently had a destabilising effect on the investment market. The representative of Company D also indicated that inter-industry competition was a cause of frequent and radical change, particularly with the players in the market viewing to compete on both price and service differentiation. It was the unanimous view of the respondents that the strategic use of IS/IT had both changed their business and was in turn changed by it. In all cases a flexible IT infrastructure and the ability to develop or re-engineer IS applications rapidly was held to be of vital importance;

- **Support for Strategic Alignment**

This category establishes the value which the participants place upon functional strategies and infrastructures that are in alignment. This issue was obviously an important one. The Senior Executive of Company B indicated that the issue was considered at the highest level of the organisation and that a formal technique (the MIT 90s Strategic Alignment Model) had been used to co-ordinate the business and technological strategies and infrastructures. He spoke of the amount of research that the company had carried out in finding SAP. This was carried out as a result of his experience in attempting to develop a strategic system at another banking group which had failed because of a lack of alignment between the business strategy and the IT strategy. There was, however, no evidence that Company B had sought to link its IT strategy to its IS applications portfolio. The respondent recognised this and indicated that his previous experience may have led to the company focusing on the former at the expense of the latter. Without prompting he voiced the opinion that the use of a strategic linking method could provide guidelines which would ensure a more complete coverage of the process. Company C also placed a great importance on achieving strategic alignment and had also used a formal technique for co-ordinating strategic development in IBM's Business Systems Planning technique (BSP), which had been used in the company for some time. The importance of achieving cohesion between the IT strategy and the IS applications portfolio was also emphasised by the

Chief Executive, and again a formal technique (taken from the Information Engineering method) had been used, in this case for the first time. The Head of Group Information Systems of Company E, which is part of a manufacturing conglomerate, spoke of the need to co-ordinate the logistics and manufacturing strategies and to ensure that the organisational and technological infrastructures were cohesive. His organisation had also invested much time in examining and learning to use IBM's Business Systems Planning and Arthur Anderson's Method-1. The other organisations gave slightly less importance to the issue, but had still attempted the process using 'in house' or informal methods of alignment.

12.5.4 Common Issue 4: Methodological or Technical Support

This common issue was formed during the axial coding phase to embrace the issues relating to the use and success of the techniques (12.3.3) and the activities in the strategic linking process (12.3.2). The responses that fitted into this category were extremely varied, both in terms of the methods used and the activities supported by the methods. The Logistics Director of Company A indicated that only the development of the strategy had been supported by a formal technique, and that this had been developed in house. He spoke of the difficulty of operating without technical support and indicated that, in his opinion, the development process would have been conducted more easily and more quickly if such methods had been available to the developers. He placed a low value on the support that was available from the methods known to him. Company B contributed a similar experience, having used the MIT 90s transformation graph for identifying the business benefits to be gained from the development. The Senior Executive of this company also placed a low value on the support for the whole development process that was given by the method. The Systems and Data Architecture Manager of Company D expressed a considerable amount of frustration at the apparent lack of methodological support for the linking process. His background as a systems developer had made him aware of the range and potential of conventional systems development methods, and he was disappointed that similar technical support was not available at, as he put it, 'the higher level of strategic systems development'. He pointed out that five of the six major activities had involved the creation of an *ad hoc* and informal technique, and he spoke of the amount of time involved in this in relation to the low level of success that was achieved. He also spoke of the need for an integrated method or set of methods rather than just disconnected techniques and expressed great interest in the present research.

Company E had used one recognised method (Arthur Anderson's Method-1) to support only one of the six identified development activities, rating the available technical support in the other areas as 'less than useful'. There were, however, more positive feelings towards the available methods from the remaining two companies. Company F had

enjoyed a greater degree of success in developing its strategic system, and it had used a variant on Kotler's segmentation technique (Kotler *et al.* 1989) to support two of the major activities and the RONA performance tree to support two more. The Group IS Manager expressed the opinion that the techniques were not perfectly suited to the activities which they had supported, and that the strategic linking process as a whole in his company would have been more successful if an integrated method intended specifically for this purpose had been available. Company C had employed the most methodological support, having used a proprietary technique to support every one of the major development activities. The Chief Executive felt that these techniques had been useful, and valued highly their contribution to the success of the development process, although he commented on their lack of integration, describing them as 'a number of separate techniques rather than a method'. Mixed as the participants' experiences may be, the combined evidence of the responses to this category is unequivocal, and may be expressed as follows: first, there is clearly a demand for the use of a method or methods rather than unconnected techniques to support the development activities. Second, there are apparent gaps in the practitioners' knowledge of the available linking methods and third, the firms that have used technical support used approaches that are based on separate, unconnected techniques rather than an integrated method.

12.6 Analysis and Refinement of Data

The purpose of this section is to describe the findings of the interviews in terms of the refined categories which evolved from the illustrative categories (Section 12.3) through the comparative analysis or 'coding' of the data (Section 12.4). The exercise begins with an open coding exercise that forms the responses to questions in the illustrative categories into 'coded categories' of important related themes. In theory, this could lead directly to an axial coding exercise, in which themes are correlated between the coded categories to form 'refined categories'. In fact, it was not possible to produce a comprehensive set of refined categories, as the design of the original illustrative questions led to gaps in the data. It was therefore necessary to revisit the participating companies and ask further questions of the original respondents. An additional set of illustrative questions was framed. The responses to the total set of illustrative questions produced findings that are of the utmost importance to the research, in that they appear to indicate the need for a method for linking the business strategy to the strategic systems development process. Ultimately, however, the refined categories described in this section are the most important part of the validation process as they involve eliciting the respondents' views on the effectiveness of SLIM/SLIP as if it had been available to support the development of their organisation's strategic IS/IT application. This involved integrating (through axial coding) the issues which relate to the major activities of the strategic linking process. In all cases the respondents had been supplied with material which described the techniques

and the way they would be combined as a method and operated in practice. The interviews had not gone ahead until the researcher was sure that the respondents understood and were comfortable with this information. The participants were informed that the documentation that would be needed to support the method in practice would have to be far superior to that used for the validation exercise, but that its creation is beyond the scope of this research. Each walk-through was preceded by a 'talk-through' where the researcher gave a verbal briefing on how SLIM/SLIP would work in practice. The rationale behind the grouping of data into refined categories is explained in the following sections:

12.6.1 Refined Category 1: Understandability and Learnability of SLIM/SLIP

This category contains responses relating to what extent the proposed SLIM/SLIP would be understood and could be learned by a typical practitioner. The Logistics Director of Company A indicated that he found the proposed method to be complicated and complex. However, he stated that the aim of the method and the techniques themselves were understandable and estimated that the business strategists in his organisation would have little difficulty in learning to use the techniques. He thought that the technologists might have a little more difficulty in understanding some of the more 'business orientated' techniques due to their relative unfamiliarity. He offered the opinion that the method was no more difficult to adopt (in a personal and organisational sense) than a typical systems analysis method such as SSADM. This respondent felt that the contingency aspect of SLIM/SLIP would present the most difficulty to new users, foreseeing that,

It might be difficult to know what to leave out in unfamiliar situations. I would prefer (the development team to have) more explicit guidance from the method to make up for the (team's) lack of experience.

The researcher and respondent agreed that this problem occurs with any development method where contingency selection (as with Multiview) or 'templating' (as with SSADM) is involved. The Senior Executive of Company B had no experience of any of the techniques that make up SLIM/SLIP. He felt that there would be problems in learning the method, but pointed out that the objective was not to 'learn' the method but to gain sufficient knowledge of the method for it to be effective at the first time of use. His organisation would be unlikely to use the method repeatedly, so he saw a conscious learning process as being redundant and he envisaged a situation where the use of method would be facilitated in practice by a skilled SLIM/SLIP consultant.

With this assistance he felt that the average manager or IS/IT practitioner would understand the method. The Chief Executive of Company C had experience of a number

of the techniques that make up SLIM/SLIP, either in practice or on an information strategy module of an MBA course. He felt that the method should be learned by walking it through before using it in practice. He also felt that it would be best to have the experience of knowledge acquisition facilitated by a consultant, but foresaw no serious problems in promulgating the method within his organisation. The respondents from Companies D, E and F are all from a technological background and declared themselves unanimously to be unfamiliar with many of the 'business orientated' techniques that make up SLIM/SLIP. They are, however, familiar with the use of systems development methods (SSADM in all cases) and felt that SLIM/SLIP would not be more difficult to learn or to understand than would a typical conventional analysis and design method. The practical suggestions of all three respondents reinforced the previous views that the best way for an organisation to acquire knowledge of SLIM/SLIP would be to use a consultant as a facilitator of the process. They rated the 'learnability' of the method as medium.

12.6.2 Refined Category 2: Practicality of the SLIM/SLIP Method

The illustrative questions in this category are intended to establish the respondents' opinions of the likely practicality of SLIM/SLIP in operation. Three factors are taken to indicate that the proposed method would be successful in practice. These are: first, the 'size' of the method (i.e. the number of techniques or steps it contains), second, its scope (i.e. the number of issues it seeks to address) and third, its complexity (i.e. the nature of the relationship between the techniques or steps). The respondents were unanimous in commenting on the size and complexity of SLIM/SLIP. The factors that formed the basis of these comments were as follows. First, the number of the techniques which make up each of the four linking frameworks (strategic vision, strategic positioning etc.), second the complexity of the frameworks (as indicated by the relationships of the techniques) and third, the scale of some of the individual techniques within the proposed method. The respondents agreed that the task of linking the business strategy to the development of strategic IS/IT applications is a complex enterprise of considerable scope and scale in all of their organisations. It was the respondents' common view that a method for supporting such a process would need to have a commensurate degree of complexity.

The usability of SLIM/SLIP was the final issue in this category. As with the previous category there was a noticeable separation of views on the usability of the proposed linking method according to the background of the respondents. The respondents from Companies D, E and F (all from a technological background) consistently compared the practicality of SLIM/SLIP to that of conventional systems development methods, SSADM in the case of the first two of these companies and IE in the case of the third. They all felt that SLIM/SLIP would be at least as practical in use as a major systems analysis and

design method. The other respondents from companies A, B and C (all from a business background) had experience of some techniques or frameworks that are more associated with business analysis or strategy development. Of these it was felt (by the respondent of Company A) that only Michael Porter's value chain analysis approach came close to SLIM/SLIP in terms of scope and/or scale. However, in spite of the relative lack of experience of this type of method on the part of the respondents from Companies A and C, both expressed positive opinions of its practicality based on a walk through of the use of SLIM/SLIP by the researcher. Only the respondent from Company B maintained significant reservations about the practicality of SLIM/SLIP in operation.

12.6.3 Refined Category 3: Effectiveness with the Strategic Components

The issues in this category were elicited in response to questions about the participants' estimates of the support that SLIM/SLIP would have given when they developed the strategic systems identified in Section 4 of the survey questionnaire. This is potentially the most important part of the validation process. It impinges upon a number of the issues identified in the comparative analysis of data (Section 12.4), so it was decided to delimit the category by presenting the data in relation to the components of the strategic linking process. The results of this exercise are as follows:

- **Effectiveness with Strategic Vision**

There was a general indication that SLIM/SLIP, whether it was regarded as a loose set of techniques or as a cogent self-contained method, would be effective in supporting the development of the linking components that the respondents felt to be important. The Logistics Director of Company A felt that the use of SLIM/SLIP would promote the development of his organisation's strategic vision as it would provide guidance to the stakeholders in that process, and that it would be particularly effective in communicating this vision to the systems developers. The views of the Senior Executive of Company B tended to endorse this view, as he took a pragmatic view in suggesting that the techniques contained within the proposed method all had implied validity from their use in other application areas,

They (the techniques) work in areas that are very similar. If they solve problems in those areas they would solve the problems we found in developing a vision to base our systems on and getting people to understand it.

The respondent from Company D gave the opinion that SLIM/SLIP would help in developing a strategic vision within his organisation. However, he was less enthusiastic about the proposed method than some of the other participants. He felt the complexity of the method might interfere with its effectiveness in practice in his organisation (an international airline) due to its complexity, although he conceded that

it 'would almost certainly be effective in simpler, less distributed organisations'. The participants from Companies C, E and F all felt that SLIM/SLIP would have helped them and considered that it would be effective in supporting the strategic vision component without serious reservation;

- **Effectiveness with Strategic Positioning**

There was more agreement among the respondents in relation to this component. The respondents from companies A and B, which had not used any 'formal method' to support the tasks which relate to this component in developing their strategic systems, expressed great confidence in the method. The Chief Executive of Company C, and the Head of IT of Company F, both of whom have considerable experience of proprietary technical support in this area, felt that SLIM/SLIP would be more effective in practice than the techniques they had used. The respondents from companies D and E, which had used 'in-house' techniques were of the opinion that SLIM/SLIP would be more effective than the actual techniques as SLIM/SLIP was better formed and the individual techniques had features which were more appropriate to this application. Three of the six respondents (from companies A, B and C) were already familiar with the proposed strategic positioning techniques and were convinced of their effectiveness in this application;

- **Effectiveness with Strategic Flexibility**

The greatest confidence in the effectiveness of SLIM/SLIP in support of the strategic positioning component came from the respondents with the greatest degree of business orientation (i.e. companies A, B and C). Conversely, the greatest belief in its effectiveness in support of strategic flexibility came from the more technologically orientated respondents in companies D, E and F. This was due to the importance of flexibility in designing IT infrastructures. The Systems and Architecture Manager of Company D confirmed the importance of the issue of strategic flexibility. He gave the opinion that the proposed approach (a flexibility framework supported by proven techniques) would almost certainly be more effective in practice than the various in-house methods that his organisation had used in developing its strategic system. The Head of Group IS of Company E also had experience of an in-house approach to flexibility, and he also felt that the part of SLIM/SLIP which is intended to address the same issues would be more effective in practice. The respondent from Company F, also an IT professional of some 20 years experience, was most enthusiastic about the use of SLIM/SLIP in this application and professed to be 'very confident about its effectiveness' in supporting strategic flexibility in his organisation;

- **Effectiveness with Strategic Alignment**

If the issues relating to the two previous strategic components show a bias of importance to one side of the technological divide or the other, this component

integrates both sides, in that it seeks to achieve cohesion between the business and technological strategies and infrastructures. As such, the expressed belief in the effectiveness of SLIM/SLIP is more equal among the participating organisations. In the original survey the Logistics Director of Company A had rated his organisation's success in achieving strategic alignment during its system development as low. In the interview he attributed this to a lack of knowledge of the importance of alignment to the linking process, and stated that in his opinion, SLIM/SLIP was 'a good awareness framework', in that it stressed the importance of strategic alignment.

The respondent from companies B and C also felt that the alignment component of SLIM/SLIP was an effective communication tool, and all three respondents rated the proposed method as very effective in their retrospective 'walk-throughs' of their systems development processes. The Systems and Data Architecture Manager of Company D had also indicated a low degree of alignment success in practice. His background, however, had inculcated in him the importance of achieving alignment, and he felt that the strategic alignment component of SLIM/SLIP was 'a potential answer to our problems'. He also commented on the likely effectiveness of basing the component on the MIT 90s model, which has itself undergone practical validation (Luftman 1995). The respondent from Company E had rated his organisation's success in achieving alignment as high and had used Method/1 to achieve it. Nevertheless, he expressed the opinion at the walkthrough that the alignment component of SLIM/SLIP would be 'at least as effective in practice as it is more specialised'. The Head of IT of Company F had previously indicated that his organisation had not attempted to achieve strategic alignment in its system development process. This rather complicated the retrospective walkthrough in this area, but when he had become sufficiently familiar with the exercise, he offered the opinion that SLIM/SLIP would be effective in practice.

The results of the interviews indicate that, in the opinion of the participants, SLIM/SLIP would support the relevant strategic linkage components, and would improve that part of the strategic linking process. However, a method is more than a collection of techniques and must be valid in its own right. Validity is of particular importance to the development of a theory about the method (the next stage of the GT approach) if it is to be capable of generalisation. It was therefore necessary to integrate the responses in the refined categories (Section 12.4) to form a category that contains data about the overall effectiveness of SLIM/SLIP as a method. This is described in the following section.

Strategic System Development Activities						
Company	Act. 1	Act. 2	Act. 3	Act. 4	Act. 5	Act. 6
A	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓	✓
B	✓✓✓	✓✓✓	✓✓✓	✓✓✓	x	✓
C	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓
D	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓
E	✓✓	✓✓✓	x	✓✓✓	✓✓✓	✓
F	✓✓	✓✓✓	✓✓✓	✓✓✓	x	✓

Key to table:

Activity 1 Developing the business strategy/identifying opportunities

Activity 2 Identifying 'high impact' applications in the IS/IT portfolio

Activity 3 Identifying potential to use IS/IT to support strategy/opportunity

Activity 4 Linking the business strategy with the IS/IT strategy

Activity 5 Linking the IS and/or IT strategy to the IS applications portfolio

Activity 6 Identifying and planning benefits of to be achieved by the system

Respondent's rating of effectiveness of support for linking activity:

✓ = weak ✓✓ = medium ✓✓✓ = strong x = absent or no rating

Figure 12.2 Coverage of Strategic Linking Activities by SLIM/SLIP Method

12.6.4 Refined Category 4: Overall Effectiveness of the SLIM/SLIP Method

There are two possible ways to assess the probable performance of SLIM/SLIP as a method. First, the common issues relating to the effectiveness of SLIM/SLIP in supporting each of the four strategic components (see above) can be synthesised by combining the feedback from the existing walkthroughs and estimating the method's performance over the whole strategic linking process. Second, it is possible to estimate the performance of SLIM/SLIP from the participants' responses in relation to the activities actually used in the development of the strategic system described in the original survey. It was decided to do assess overall effectiveness by the latter method, as it is believed to be more reliable than synthesising other data and provides a useful correlation with the approach that looks at the method's effectiveness in support of the strategic components as described in Section 12.5.3. The results of the analysis are shown in Figure 12.2, with a cross showing that the company had not used that

particular activity in developing its strategic system and a larger number of ticks indicating a better performance in support of a particular stage. For instance, the figure shows that Company A had used all of the six activities and the representative of this company gave an opinion that SLIM/SLIP would have offered strong support to three of these activities, medium support to two and weak support to one activity.

The exercise gives several interesting results. First, there is a notable degree of consistency in the method's support for the activities in the linking process. All of the companies had included five of the activities and half of them had included all six. The activities that would have been supported most fully by SLIM/SLIP are 'identifying high impact applications in the IS/IT portfolio' and 'linking the business strategy with the IS/IT strategy'. Both, it is felt by the respondents from all six companies, would receive 'strong' support from SLIM/SLIP. The activity that is judged to receive the least effective support by all the participants is 'identifying and planning the benefits of to be achieved by the system' which was rated as receiving weak potential support from SLIM/SLIP. This indicates that the proposed method would provide medium or strong support for five of the six linking activities and this category also contains responses which relate to the acceptability of the SLIM/SLIM method to the participating organisations. Possibly the most important factors in the validation process are whether the respondents would be prepared to use SLIM/SLIP, and whether they believe it would have offered a superior performance to the method or techniques actually used to support the activities of the strategic systems development process. A negative indication in response to these factors would place a question mark over the viability of the method and would therefore reduce the value of the research. The Logistics Director of Company A rated the predicted performance of SLIM/SLIP as 'good' and felt that its use would have improved the process of developing the strategic system in his organisation.

The Senior Executive of Company B had expressed dissatisfaction with the lack of formality of his firm's approach, and was more enthusiastic about the potential of SLIM/SLIP, giving the opinion that it would have provided a great improvement to his organisation's development process. The Chief Executive of Company C had some experience of formal planning techniques (i.e. the strategic grid and IE) and commented on their relative simplicity, but felt that SLIM/SLIP would have offered 'a considerable improvement' and indicated that he would be prepared to use the proposed method in practice. The Systems and Data Architecture Manager of Company D was a member of a group within his organisation which had been responsible for developing a number of in-house techniques that were used to support individual tasks within its strategic

systems development projects. He expressed the opinion that SLIM/SLIP possessed a higher degree of integration than the set of methods of which he had experience and indicated that he would be prepared to use SLIM/SLIP in practice. He felt that it would 'perform well and provide a useful degree of support'. The Head of Group IS of Company E commented that it was difficult to judge the relative potential or acceptability of SLIM/SLIP as, to his knowledge, there were no truly comparable methods to which to compare it. His organisation had used Method/1 for a part of its linking process, but he felt that SLIM/SLIP was 'more comprehensive' and he commented that his organisation was 'ready to change up to a linking method that would offer more potential'.

The Head of IT of Company F had considerable experience of the use of some of the more business-orientated techniques as he had used Kotler's market segmentation and the RONA performance tree. However, as a technologist, he expressed some reservations about their effectiveness in support of the more technological aspects of the linking and development processes. He felt that SLIM/SLIP would offer a 'more balanced support for both the business and technical tasks' and would 'hold together as a method'. He indicated that he would be 'more than prepared to use the method in a future project' if it were properly packaged and were supported commercially. Having integrated the responses into the foregoing categories, the participants were visited once more to check that the reported statements were an accurate representation of their views and that they were in agreement with the conclusions which resulted from the comparative analysis and delimitation exercises. The respondents were allowed to read the analytical memos from which this chapter is formed and a draft of the chapter. They were encouraged to comment on the interpretation of their responses in the analytical memos and to ask and to answer additional questions. There were, in fact, some minor amendments to the text, largely based on the researcher's interpretation of detailed answers to the illustrative questions, which were incorporated into this chapter. None of these affect the validity of the conclusions, so it is possible to move on to theory construction, the final stage of the modified GT approach.

12.7 Theory Construction

Theory construction is the final substantive part of the present research. One purpose of a theory is to allow the findings from one research exercise to be generalised so that the results may be said to apply to other situations having similar properties. In the case of the present research, it is intended that the experience and opinions of the practitioners will form the basis of theories that will aid the strategic linking process in other organisations in the future. Before these theories can be formed it is necessary to

examine the validity of the proposed strategic linking method, which is the subject of the following section.

Rated Effectiveness of SLIM/SLIP in Practice

Attribute	Coy A	Coy B	Coy C	Coy D	Coy E	Coy F
Learnability	✓✓	✓✓✓	✓✓✓	✓✓	✓✓	✓✓
Practicality	✓✓✓	✓✓	✓✓✓	✓✓	✓✓	✓✓
Coverage	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓
E-Vision	✓✓✓	✓✓✓	✓✓	✓	✓✓✓	✓✓✓
E-Position	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
E-Flexibility	✓✓	✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓
E-Alignment	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
Overall	✓✓✓	✓✓✓	✓✓✓	✓✓	✓✓✓	✓✓

Key to table:

Learnability: How easy SLIM/SLIP would be understand and learn in practice

Practicality: How practical SLIM/SLIP would be in operation

Coverage: How SLIM/SLIP would cover strategic development lifecycle

E-Vision: Effectiveness of SLIM/SLIP support for strategic vision

E-Position: Effectiveness of SLIM/SLIP support for strategic positioning

E-Flexibility: Effectiveness of SLIM/SLIP support for strategic flexibility

E-Alignment: Effectiveness of SLIM/SLIP support for strategic alignment

Respondent's rating of effectiveness of support for strategic linking:

✓ = low effectiveness, little confidence in SLIM/SLIP method

✓✓ = medium effectiveness or SLIM/SLIP just better than existing method(s)

✓✓✓ = very effective support or high confidence in SLIM/SLIP method

Figure 12.3 Effectiveness of SLIM/SLIP in Supporting Linking Activities

12.7.1 Validity of SLIM/SLIP

The data that was collected from the refined categories of questions in Section 5 and that are represented in Figure 12.3 was given an informal rating. It was decided to give each of the dimensions (e.g. 'learnability', practicality etc.) a score out of 18 (i.e. a maximum three for each company) and to give each company's rating of all the dimensions a maximum of 24 (i.e. a maximum of three for each dimension). A decision had to be made about the response level at which validity could be accepted. The

advice of statisticians was sought, and it appeared that no formal statistical technique was particularly suitable for this purpose.

Dimension	Total/18	%	Comment
Learnability	14	77.7	Moderate validity
Practicality	14	77.7	Moderate validity
Coverage	15	83.3	High validity
E-Vision	15	83.3	High validity
E-Position	18	100.0	Complete validity
E-Flexibiility	15	83.3	High validity
E-Alignment	16	88.8	Very high validity
Company	Total/24	%	Comment
Company A	21	87.5	Very high validity
Company B	22	91.6	Very high validity
Company C	22	91.6	Very high validity
Company D	19	79.1	Moderate validity
Company E	22	91.6	Very high validity
Company F	19	79.1	Moderate validity

Figure 12.4 **Validity of SLIM/SLIP Method**

The consensus of opinion was that a positive response of more than 50% would indicate validity. It was decided, however, that validity would be proven by an arbitrary (but more stringent) score of 75% or above in each dimension and for each company in total. The result of this exercise, expressed as percentages and rated informally in terms of the ‘degree of validity’, are shown in Figure 12.4. The proposed SLIM/SLIP method was held to be valid in terms of all of its dimensions and as a method by all of the companies, but there are several issues that merit further examination. First, the method achieved a moderate degree of validity in the dimensions of ‘learnability’ and ‘practicality’. The respondents feel that the method will be difficult to learn and that there may be problems in its application in practice. This is accepted, but the respondents agreed that all examples of strategic plans or systems developments present problems in both of these areas and SLIM/SLIP is no more problematic in these areas than most other large-scale proprietary methods. Second, two of the companies (D and F) awarded SLIM/SLIP a moderate degree of validity overall. It is also held that the scores in these cases (79.1%) indicate an acceptable degree of confidence in the proposed method on the part of the respondents.

In terms of the other dimensions, three others had a high degree of validity, one a very high degree and one (effectiveness in support of strategic positioning) achieved complete validity in that it was given a maximum rating by all of the respondents. The other four companies gave SLIM/SLIP a very high degree of validity in terms of overall effectiveness of the proposed method. It is contended that these results are unequivocal. The proposed SLIM/SLIP method is valid in terms of the dimensions that resulted from the quasi-field study and is also held to be valid as a method by all of the responding companies. Having proved the validity of the method, it is now possible to conclude this part of the research by formulating some theories.

12.7.2 Theories About the Proposed SLIM/SLIP Method

The theories with which this research project must conclude are produced from the hypotheses that were developed in Chapter 5 and analysed in Chapter 6 and from the findings of the quasi-field study as is described previously in this chapter. These theories are important, as they will enable the results of the research (i.e. the validated SLIM/SLIP framework) to be generalised across other organisations on other occasions. These theories are as follows:

- Successful UK companies which have developed strategic system consider a set of abstract strategic components to be an important part of the process of linking their business strategy to the development of their strategic IS/IT applications. These strategic components are therefore an important part of the strategic linking process. In this research they are termed strategic vision, strategic positioning, strategic flexibility and strategic alignment;
- There is a set of recognised activities which can be said to make up a lifecycle of the development of strategic IS/IT applications and this set of activities is effective in developing strategic IS/IT applications. There are proprietary or academic methods and techniques that can support the process of linking the business strategy to the development of strategic IS/IT applications through the development activities. These techniques, however, are not well known, are insufficiently developed and lack the features of a method;
- The proposed SLIM/SLIP strategic linking method can be learned by experienced practitioners in typical organisations and would prove practicable in operation in such organisations. The proposed method is likely to prove superior in these respects to the various in-house, informal and proprietary methods that are currently in use;
- The proposed SLIM/SLIP method provides an adequate coverage of the lifecycle or set of activities which is used to link the business strategy to the development of strategic IS/IT applications. The SLIM/SLIP method is likely to be more effective in

supporting the strategic linking components than the existing methods and techniques. The proposed method also provides a valid way of linking these linking activities to the abstract strategic components. This is likely to increase the effectiveness of the strategic linking process and improve the success of the development of strategic IS/IT applications in typical organisations;

- The proposed SLIM/SLIP method would be effective in supporting the abstract strategic components in support of the strategic linking process. The method would provide good support for strategic vision and strategic flexibility, very good support for strategic alignment and excellent support for strategic positioning. The SLIM/SLIP method would therefore increase the effectiveness of the strategic linking process in a typical organisation and contribute to making that organisation's strategic IS/IT applications more successful and effective. This, in turn, is likely to increase the success and effectiveness of the organisations.

These theories provide a useful contribution to the body of knowledge and to practice in the area of strategic IS/IT applications, and specifically the linking of the business strategy to the development of strategic IS/IT applications in typical organisations. If the proposed method is to be truly useful and practicable in an operational context it will need to be developed into a proper method, with the marketing effort, technical documentation and user guidance and support that this implies. This is obviously beyond the scope of the present research project but would be a logical extension of it. This issue is addressed in the next section.

12.8 Support for the Research Hypotheses

The development of the research hypotheses is described in sections 6.1 and 6.2, and their testing is described in the remainder of Chapter 6. It is useful to restate the three hypotheses in the conclusion to the research and to summarise the results of the tests, based on the univariate analysis of the survey data in section 6.6.

12.8.1 Hypothesis H1

UK companies that can be considered as successful in a variety of business sectors do define and develop strategic IS/IT applications, and such applications do make an important contribution to their commercial success.

The test of the first part of this hypothesis is described in section 6.6.4, and 83.3% of the responding organisations (which are randomly distributed throughout the list of the top 1000 UK companies) had identified and developed strategic IS/IT applications. The test goes on to record the reasons for considering the application(s) to be strategic. This is a 'control question', as invalid reasons would leave this part of the hypothesis unsupported.

The reasons given (see section 6.6.4 question 4b) fit well with the definitions of strategic systems derived from the literature search in Chapter 3. This part of the hypothesis is therefore supported. The second part of the hypothesis is examined in section 6.6.3 question 3c and section 6.6.4 question 4d. The first test indicates clearly that four of the strategic components identified in Chapter 4 are important to the organisations. All of the organisations' strategies contain five of the strategic components that are represented in the research questions and hypotheses. The value chain integration component is included in the survey, although its importance was not supported by the literature search in Chapter 4. The four components that were identified in Chapter 4 are rated as highly important in 36.9% of the responses. The second test indicates strongly that the applications are developed to support the strategic components. Over 90% of the responses indicate that the IS/IT application was developed to support one of the strategic components identified in Chapter 4. This part of the hypothesis is therefore supported, although it must be partly qualified by the response to section 6.6.4 question 4e, which indicates that the systems were relatively unsuccessful at supporting their intended strategies. This is taken to indicate a need for better technical design and functioning of the strategic IS/IT applications in UK companies. The overall findings of the survey therefore indicate that Hypothesis H1 is supported, in that successful UK companies develop strategic IS/IT applications that contribute to their strategic success.

12.8.2 Hypothesis H2

Successful UK companies do consider the aspects of business strategy termed positioning, flexibility, vision and cohesion or alignment to be important components of the link between business strategy and the development of strategic IS/IT applications.

This hypothesis is tested in section 6.6.3 question 3c. The respondents were asked to rate the importance of the main strategic components that were identified in the literature search (see Chapter 4). Four of the five components included in the test were shown to have considerable importance. Competitive or strategic positioning was regarded as having an above average importance (i.e. a 3/4 or 4/4 rating) by 84.8% of the respondents, strategic flexibility by 72.7%, strategic alignment or cohesion by 63.6% and strategic vision by 69.6%. The other component, value chain integration, was regarded as less important with a 34.8% response rate. Clearly, the four components identified in Chapter 4 (i.e. strategic positioning, strategic flexibility etc.) have a high degree of importance in successful UK companies. It is possible to take this hypothesis one stage farther by examining the response to section 6.6.3 question 3b. The main strategy that occurs most frequently is differentiation of products and/or services from those of rivals, with a 52.5% response rate. The literature search in chapters 3 and 4 shows that both strategic

positioning and flexibility are important prerequisites of a strategy based on differentiation. Similarly, strategic alignment (i.e. the co-ordination of corporate strategies and infrastructures) and strategic vision are likely to be most important where growth by self-generated expansion is concerned. This is recorded as the main strategy by 18.2% of respondents. It could be argued that the strategic vision component is important in supporting both types of growth strategy (i.e. through self-generated expansion and through partnerships and alliances), which together achieve a rating of 30.3%. In seeking to examine this hypothesis, it remains to establish the link to the development of the strategic IS/IT application. It is possible to do this by examining the organisations' intentions in developing the application. In section 6.6.4, the responses to question 4d indicate that 27.7% of the respondents linked the development of the IS/IT application to strategic alignment, 25.9% to strategic positioning, 20.4% to strategic flexibility and 16.7% to strategic vision. A clear link between the strategic IS/IT application and one or more of the four strategic components was indicated by 90.7% of the respondents. The survey results therefore indicate that Hypothesis H2 is supported, in that successful UK companies consider the aspects of business strategy termed positioning, flexibility, vision and cohesion or alignment to be important components of the link between business strategy and the development of strategic IS/IT applications.

12.8.3 Hypothesis H3

There are published techniques which can be used for linking business strategy and strategic IS/IT applications, such techniques can be combined to support the aspects of business strategy termed positioning, flexibility, vision and cohesion or alignment, and these aspects can form a framework for developing strategic IS/IT applications.

This hypothesis is tested in two ways. The first test is through the literature search into the techniques to support the strategic components in chapters 7, 8, 9 and 10. This part of the hypothesis is tested by the existence of suitable techniques that have been used in practice or described in reputable publications. The results of this test are positive, in that a number of techniques, methods or frameworks that meet the criteria are identified and described. The second test is through the proposal for linking the supporting techniques into a model and process for linking the business strategy creation and strategic applications development processes. This is the SLIM/SLIP method described in Chapter 11 and validated in Chapter 12. The validation of SLIM/SLIP by a sample of the original survey population indicates strongly that the techniques can be combined to support the four strategic components. Hypothesis H3 is therefore supported, as there are published techniques that can be used for linking business strategy and strategic IS/IT applications. These techniques can be combined to support the four strategic components (i.e. strategic

positioning, strategic flexibility, strategic vision and strategic alignment) and the techniques can be formed into a valid framework or process for developing strategic IS/IT applications. The use of the proposed framework is likely to improve the linkage of business strategy to the development of strategic IS/IT applications in a typical organisation.

12.9 Evaluation of the Research

At the end of a long-term project such as this it is important to carry out a critical evaluation of the research from a number of perspectives, mainly of a personal nature. This evaluation therefore provides a subjective overview of the following critical aspects of the research. First, the research methods that are used and their suitability for the research domain, second, the effectiveness of the research as a learning process, third, alternative directions that the research may have taken, fourth, the success of the research, and finally the possibility of further extensions to the research. These important aspects are described in more detail in the following section:

12.9.1 Critique of the Research Methods

The project began with some 'research into research' (reported in Chapter 2) that identified a bewildering array of possible qualitative research methods, following a number of apparently contradictory philosophical approaches, from which a choice had to be made. It must be admitted, however, that the importance of making the correct choice was not clear at the outset. This, it seems, is the essential paradox of research. To be effective, the research tasks and processes must be supported by the correct methods and yet each doctoral research project is, by definition, a 'voyage into the unknown' for the researcher. It is apparent that, while it may be one continuous project, this research has a number of discrete phases, each of which is supported by a different research method.

The first phase relates to the literature search. Taking an essentially interpretivist perspective brought an increasing understanding of the phenomenon of strategic information systems. More specifically, it placed the phenomenon of strategic systems clearly into a wider context, that of business strategy. The interpretivist paradigm proved to be suitable for its purpose as it is, 'aimed at producing an understanding of the context of the system and the process whereby the ... system influences and is influenced by its context' (Walsham 1991). This is very apt. People clearly assign a number of different meanings to the term 'strategic system' and strategic IS/IT applications are clearly influenced by (and, in turn, influence) the strategic context within which they exist. The conflict of meanings is resolved in Chapter 3 and an understanding of the business context is demonstrated in Chapter 4. Although it was relatively effective in developing an

understanding, this phase of the research was rather informal, and methodological support was lacking. Access to some recent work on formalising the use of interpretivist methods in support of secondary research would have been welcome at the time.

The next phase of the research was to carry out a survey to examine the set of hypotheses produced after the literature survey (see Chapter 6). Surveys are usually associated with the positivist paradigm, as methods that follow this paradigm assume a degree of objectivity and measurability and are suitable for 'hypothesis testing and the drawing of inferences...from a sample to a stated population' (Orlikowski and Baroudi 1991). This would apply to the present research, if its main purpose was to produce detailed and statistical information that would test the hypotheses objectively. In this case, however, the survey is intended to examine a phenomenon rather than to prove its existence and to indicate support for the hypotheses rather than to prove or disprove them.

As such, the survey is an example of primary research in support of the data gathering exercise that is carried out in the first phase of the project. The sample is 961 of the Times 1000 companies and the population is 'successful UK companies'. Although the method of the survey was sound, some of the common problems of surveys were experienced in practice. First, the proportion of returned questionnaires was lower than had been expected, and some of the companies that did not make wish to take part may have valuable information to contribute. Second, the basic univariate analysis may have failed to capture some of the more complex relationships in the data, and third, all of the participants requested anonymity, which may limit the 'publishability' of the results. Nevertheless, the survey can be judged to be successful, as it clearly adds to the knowledge of practice in the research domain and allows the main deliverable of the research (the proposed SLIM/SLIP method) to be developed (described in Chapters 7, 8, 9 and 10).

The final research method used is a quasi-field study, which is used to validate the proposed method (see Chapter 11). Validation of such a framework is difficult to achieve, but the GT approach provided good support to the process of data analysis and theory generation and allowed an unexpected level of confidence to be placed in the results. The chosen field study approach focuses on making sense of a complex situation as the facts emerge through a series of analyses (Kaplan and Maxwell 1994) while constructing formal propositions (i.e. the theories) from the data. There is some disagreement in the literature (e.g. Myers 1997, Lee 1991) about the validity of combining methods in a single study, but experience of this research suggests that the combination can be successful and the effect can be synergistic if the overall research design is sound.

12.9.2 Alternative Directions for the Research

A research project involves a number of choices and decisions that commit the researcher to a particular research design (see Chapter 2) and to a specific set of tasks. This ‘shapes’ a particular research project, but it would be wrong to assume that this is the only form that the research could take. At the end of a research project it is useful to look back and to speculate what may have occurred if other choices had been made and the outcomes of the decisions had been different. From among these alternative directions it is possible to identify some things which would definitely have been done differently in this research. First, a part of the literature search was done before the research objectives were defined, in order to ‘gather data’ to inform the research. This led in practice to a lack of direction and several ‘false starts’, even though the research questions were of long-standing interest to the researcher.

With hindsight, the research objectives should have been set earlier to inform the data gathering (and the rest of the research). Second, the research design would be done differently. Also, the generation and testing of a set of hypotheses (see Chapter 6) through the medium of a survey was excessively time consuming and labour intensive. Some useful knowledge was undoubtedly gained, but the relatively small return from the survey meant that the same results (i.e. the formulation of the four strategic linking components) could have been achieved with equal confidence more quickly by using another method. Experience of examining the grounded theory (GT) approach as a potential method of validating the proposed framework suggests that the approach could have been used as the primary method (with a smaller population) in both phases of the research with a consequent saving in time. This time saving would have allowed the use of a more ‘in-depth’ validation method, for instance the use of case studies or action research. The benefit of doing these things would be to ‘stream-line’ the research process and to allow the consequent savings in time and resources to be used to add depth and focus at all stages of the research.

12.9.3 The Research Project as a Learning Process

This doctoral research project is a personal journey that has involved the researcher in many new learning experiences. Some of these were expected at the onset of the research, while others were so unexpected as to overturn any preconceptions the researcher made have had about research in general. First, there is an expected value in acquiring further knowledge of the research domains and from the researcher’s teaching perspective, this was one of the major motivations to carry out the research. Undoubtedly, the researcher’s knowledge base (and portfolio of teaching materials) has been expanded by the literature

search. The researcher's impressions of the linkages between business strategy and systems development (which was suspected at the beginning and which prompted the research questions) have been confirmed and a clear understanding the importance of strategic IS/IT applications has been obtained. Second, there is the unexpected value of learning about the process of research and the application of the research methods themselves. Initially regarded as an inconvenience and an imposition, this aspect came to be regarded as a useful set of transferable skills.

The subjects of this research are already beginning to look dated and within a decade its contribution will almost certainly cease to have value to the academic community. The value of the learning process to the researcher, however, will endure. In particular, the fact that research methods from several different paradigms can be combined into a 'tool set' to support different aspects and phases of the research is likely to have a great and lasting personal value. Third, there is the value of learning to write. The exacting standard of authorship that the production of a doctoral thesis requires far exceeds the researcher's prior experience and has given the researcher the valuable opportunity to present joint papers at international conferences and to have joint papers published in academic journals, as described in Appendix B. Finally, the salutary lessons of maintaining the necessary level of personal organisation and persistence in the face of considerable adversity will never be forgotten. In each and all of these areas, this research project has been an effective learning experience.

12.9.4 Limitations of the Research

Most research projects cannot be considered a complete success or a complete failure. This project, as is often the case, falls somewhere between these two extremes and it would only be natural to focus on what has been achieved. With a view to helping future research practice, however, it is useful to examine what has not been achieved. First, if it is accepted that the aim of doctoral research is to capture only the latest 'leading edge' domain knowledge, then this aim has been affected by the duration of the research. As with many research projects undertaken in the part-time mode of study, the literature search spanned some five years and so inevitably 'mixes the old with the new'. In practice this has not proved to be too detrimental, as many of the fundamental contributions to the domain that stimulated the research took place prior to this time. It was possible to keep up to date with the latest publications and research methods by continuing the literature search into the later phases of the project. This gives, in effect, a longitudinal dimension to the research that adds strength to its conclusions.

Second, the survey of the Times 1000 UK companies (described in Chapter 6) was less successful than was hoped. The proportion of questionnaires returned (20.8%) was disappointing, although the reasons for this are examined in Section 6.6. The desire for anonymity on the part of the respondents may have limited the 'publishability' of the work, although eleven international conference and journal publications have resulted from the research to date (see Appendix B). The analysis of the returns proved to be limited, and if the researcher had been more expert in the use of the SPSS® package the analysis may have yielded more interesting information. However, it must be said that the survey aimed from the outset to carry out a simple univariate analysis, and those basic aims have been met. Certainly, the researcher learned a lot about questionnaire design and analysis and could now make a much better job of it in much less time.

For example, the researcher was advised by an experienced survey analyst to include a statement at the beginning of the survey instrument to the effect that respondents should 'not take too much time' in completing the questionnaire. The purpose of this statement was to ensure a 'truthful' return by requiring the respondents to give the first answer that came into their heads. This is intended to prevent participants from 'engineering' a response that they believe is expected of them. The researcher now believes, with the value of experience, that the advice may be valid in the case of 'positivist' objective tests and multiple-choice questionnaires. However, with surveys carried out under the interpretivist paradigm, which contain more complex questions from which a more considered response is required, it is felt that this approach may prejudice the quality of the information that is given in response. It was also indicated that the whole questionnaire would take 'about 30 minutes' to complete. This was intended to encourage the recipients to take part in the survey in order to produce a good response rate. There is the possibility that this may have affected the quality of the information. However, the participants in the validation process indicated that they had effectively ignored the advice. They had in fact given considerable thought to the more complex questions, and had taken longer than the indicated 30 minutes to complete the questionnaire. Since it is assumed that this behaviour can be extrapolated to the other respondents, it is unlikely that the quality of the information has been compromised.

Third, the proposed method lacks much of the structure and many of the accessories (e.g. documentation, user training) that it would require as a method-in-practice. As it is, the method has the status of a prototype or an illustration, which means that it can not be applied and validated empirically. Fourth, the validation cannot be considered as truly authoritative due to its subjectivity. The quasi-field study approach provided good support for the validation process (see Section 12.8.1) but there is the possibility that the

responses were conditioned by the presence of the researcher. Knowing that the researcher had such a direct interest in the validity of the framework, there is at least a suspicion that the participants may have wanted to please rather than to disappoint, though it must be stressed that there is no direct evidence of this. The research project must therefore be regarded as a 'qualified success', but it has nevertheless made some important contributions as described in the following section.

12.9.5 Contribution of the Research

The research has contributed to the domain of strategic IS/IT applications in three ways. First, the survey of the Times 1000 UK companies (described in Chapter 6) produced some useful information on the prevalence of strategic applications in UK organisations and the factors that had stimulated and supported the process of developing such applications. As far as the researcher is aware this research has not been duplicated in the UK. Second, there is the identification of the strategic linking components and the suggestion of techniques to incorporate them into the process of developing strategic IS/IT applications. Much of this material has already been published in the last three years (see Appendix B). Two joint papers on strategic positioning were accepted in international journals containing material that relates substantially to Chapters 3 and 7. Another joint paper relating to strategic flexibility draws heavily from material in Chapter 8. Two more joint papers on strategic vision were published with a substantial input from Chapter 9. In addition several international conference papers were presented on strategic flexibility and vision. Third, there is the proposal of SLIM/SLIP, the strategic linking method, which is the main contribution of the research (described in Chapter 11).

The survey shows that there is a clear need for a framework to link business strategy to the development of strategic IS/IT applications. The benefit of the method in use would be to assist in developing and promulgating the vision that underpins the strategy. This will aid in linking strategic positioning manoeuvres to the development of supporting IS/IT mechanisms, to help design flexible and robust infrastructures and to ensure alignment between the strategies and infrastructures in an organisation. The validation of the method (see Section 12.6) indicates that SLIM/SLIP would achieve these benefits an extent sufficient to make it worthy of further research, as described below.

12.9.6 Further research

In terms of further research, given that the SLIM/SLIP methods represents the outcome of an exploratory process (albeit grounded in sound research methods and practices), the true effectiveness of SLIM/SLIP can only be judged in practice, preferably using different research approaches such as action learning or case studies. This research would be useful

in identifying other intrinsic factors that impinge on the strategic linking process, for instance the success factors that are critical to the development of strategic systems. There would also be considerable scope for valuable research in documenting the further development of the SLIM/SLIP method and the process of making it operational (e.g. formalising the procedural guidelines and documentation). This would be a useful addition to the body of knowledge on methods as, although there are a few noteworthy examples of the development and first use of an information systems development method (e.g. Avison 1990) the literature is ripe for update in this area.

Indeed, the strategic systems development process is particularly 'understudied' from a technical standpoint, which conforms with the belief that,

In general, there is a need for further exploratory studies of systems development in practice to ascertain the true nature of the development process currently prevailing in organisations.

(Fitzgerald 1997)

Although this statement refers to the development of information systems applications it is contended that, if anything, it applies even more to the strategic linking process.

12.10 Conclusion to the Research

The research began with a set of research questions which were prompted by the researcher's experience and by a literature survey in the area of strategic IS/IT applications (Chapter 3) and the frameworks by which they are defined and developed (Chapter 4). These research questions prompted a set of hypotheses about the nature of the links between the business strategy and the strategic systems development process (Chapter 5). These hypotheses were tested by means of an analytical survey of successful UK companies, and the interpretation and implications of these findings are discussed in Chapter 6. The results of this survey are generalised examples of industrial practice in the area of strategic IS/IT applications. They provide a critical perspective on the use of methods and techniques in this area. This survey adds significantly to the to previous research in its own right for three reasons. First, it identifies the importance to a range of organisations of four hypothetical strategic linking components. Second, it confirms the use of a set of strategic systems development tasks and third, it highlights the limitations of the existing methods or techniques that are used to support the application.

Prompted by this deficiency, the research goes further, as it analyses (by a further literature search) the methods and techniques which are available to support the proven strategic linking components and recommends the most suitable techniques in Chapters 7, 8, 9 and 10. These techniques were then integrated in Chapter 11 into a proposed method

(called SLIM/SLIP) for linking the business strategy creation and strategic systems development processes that would prove superior in practice to the existing methods. This contention was then validated in Chapter 12 by carrying out field interviews involving a representative sample of strategists taken from the original survey population. Finally, by using a quasi-field study, a set of theories were expounded that postulate that the SLIM/SLIP method would exhibit the following properties and values in a typical organisation. First, it would be more effective at supporting the strategic linking process than existing methods. Second, it would increase the effectiveness of the strategic linking process and third, it would contribute to making such an organisation's strategic IS/IT applications more successful and effective, in turn increasing the competitiveness of the organisation.

There are considerable business benefits which can accrue to organisations from their strategic use of IS and IT and the literature abounds with examples of success. Throughout the first two eras of IT use the technical and business domains proceeded along parallel paths. The coming together of these two domains in the strategic IS/IT era (Earl 1989) resulted in the recognition of the concept of strategic systems. It appears that at the end of this work the sparse definition of the term strategic system or strategic application which is given in Chapter 2 is not adequate to describe the reality of the complex and multi-dimensional linkage between the business strategy domain and the technological domain. The nature of this relationship appears to escape categorisation as much as it defies understanding. At first view it can seem to be an area richly populated by frameworks, methods and techniques that reach out from both domains like the ends of a bridge under construction which, with luck, meet in the middle to form a domain in its own right - that of strategic systems. The domains of creativity and rigid formalism are like the separate banks of a river that is successfully crossed on occasion not by a well designed 'bridge of method' but by explorers in a variety of craft, usually home-made and often leaking, but always showing commendable creativity and ingenuity! This supports a view that systems development (particularly, perhaps, the development of strategic systems) may be beyond the use of method (Boehm 1988, Baskerville *et al.* 1992).

The researcher's first response to improving the success and repeatability of the strategic linking process was to seek aid from the arsenal of formal methods and techniques that exist in the systems development domain. It is now time to admit that this was a case of 'looking under the lamp-post' (Angell and Smithson 1991) in that it was the easiest place to look, rather than the place where the solution lay. It is now believed that something between the metaphors of the well-designed bridge (the use of method) and the improvisation of sailing craft (the use of *bricolage* and serendipity) provides the key. The

proposed SLIM/SLIP method attempts to exploit this middle way, in that it provides the support of recognised and proven techniques but allows scope for (and hopefully encourages) creativity and flexibility. The key to this approach is that SLIM/SLIP is based on abstract components of the strategic linking process (strategic vision, strategic positioning, strategic flexibility and strategic alignment) rather than on the project management structure of stages or tasks which is the staple of many systems development methods (Fitzgerald 1997). The linking of business strategy to the development of strategic IS/IT applications by specialised methods is in its infancy. Although the use of such methods (in this case SLIM/SLIP) has been validated in theory, their future in practice remains uncertain. It is likely that the strategic linkage process, like most spheres of human activity including systems development, will go through three broad stages. In the infancy stage the process is looked upon as something of an art form and its practitioners succeed or fail according to their ability to deploy their native skills and resourcefulness in solving practical problems. This is the position from which this research began. In the youth stage the skills and knowledge of the pioneering practitioners are codified and disseminated through the medium of publication. This is the context in which the present research exists. In the final stage of maturity the various contributions to the practice are rationalised and 'integrated into a formal curriculum where they can be taught' (Fitzgerald 1997). If the proposed SLIM/SLIP method makes the smallest contribution to this body of knowledge then, for this researcher at least, the long, hard journey of this research will have been worthwhile.

Glossary

Action research	A research method that aims to contribute both to the practical concerns of people in a problem situation by joint collaboration within an ethical framework (see Chapter 2).
Alignment	(As in strategic alignment). A gradual state of cohesion or harmony that may exist between an organisation's strategies and infrastructures (see Chapter 10).
Application	(As in strategic IS/IT application). A business system. An example of IS or IT used for a business purpose (see Chapter 3).
Case study	An empirical inquiry that investigates a phenomenon within its context, especially when the boundaries between phenomenon and context are not clear. Case study research can use the positivist, interpretivist, or critical research paradigms (see Chapter 2)
Component	A part of a domain or a construct within a domain that has an existence in its own right (e.g. the components of strategy or process) for the purposes of a study (see Chapter 11)
Critical research	A research paradigm that assumes that social reality is historically constituted and that it is produced and reproduced by people (see Chapter 2).
Domain	An area of interest that has its own rules, beliefs and body of knowledge (e.g. the 'business domain').
Flexibility	(As in strategic flexibility). The ability to change as a response to unforeseen forces in the environment. Strategic flexibility may apply to the strategy itself (e.g. being able to change goals and targets) or to an infrastructure (e.g. being able to adopt new technologies or standards) that will allow new targets to be met and situations to be exploited (see Chapter 8).
Framework	See Chapter 1 for a full definition.
Function	An active part of an organisation (e.g. a business function) usually reflected in its structure or enacted by its processes. Functions (should) exist to enact strategies and are served by infrastructures. Each functional will have a strategy that must be in alignment with other strategies (see Chapter 10).

Grounded Theory	A research method that seeks to develop theory that is grounded in data that is gathered and analysed systematically recognising a continuous interplay between data collection and analysis.
Hermeneutics	A discipline that is primarily concerned with the meaning of a text-analogue (e.g. an organisation) that the researcher comes to understand through an oral or written text.
Hypothesis	A statement of current belief (e.g. based on prior research or experience) that can be tested and/or proven by further research to develop a theory (see Chapter 6).
Infrastructure	The provision of resources and services (e.g. IT platforms and networks) that underpins an organisation's functions and structure.
Instrument	A means of carrying out a research tasks, (e.g. gathering data). A questionnaire is used as a research instrument in this research (see Chapter 6).
Interpretivism	A research paradigm that starts out with the assumption that access to reality is possible only through social constructions such as language, consciousness and shared meanings.
Linkage	Something that associates or brings together two components or domains (e.g. the linkage between business strategy and IT mechanisms).
Manoeuvre	A tactical move made by an organisation to achieve a position or goal in enacting a strategy, possibly in pursuit of a vision. An organisation's strategic position is achieved and maintained by a series of manoeuvres, often enacted through IT mechanisms (see Chapter 7).
Mechanism	A means by which a strategy or manoeuvre is put into practice. An IT application may be a mechanism for achieving a business objective.
Method	See Chapter 1 for a full definition.
Objective	See Chapter 1 for a full definition.
Paradigm	An example of something that defines it or its category. An exemplar (see Chapter 2).

Phenomenology	A research paradigm that examines the research subject in terms of its effect on observers and participants, who are inextricably linked to it (see Chapter 2).
Policy	See Chapter 1 for a full definition.
Positivism	A research paradigm that assumes that reality is objectively given and can be described by measurable properties that are independent of the observer (see Chapter 2).
Position	(As in strategic position). The stance that an organisation adopts in reacting to forces in its environment (see Chapter 7).
Process	See Chapter 1 for a full definition.
Programme	An organisation's activities over time as it follows its strategic vision or achieves its strategic goals. A programme consists of a number of projects to develop infrastructures or enact manoeuvres.
Project	(As in IS/IT project). The activities through which IS applications and IT infrastructures are developed.
Qualitative research	Research methods that were developed in the social sciences to enable researchers to study social and cultural phenomena. Examples of qualitative methods are action research and case study research. Qualitative data sources include fieldwork, interviews and questionnaires (see Chapter 2).
Quantitative research	Research methods that were originally developed in the natural sciences to study natural phenomena. Examples of quantitative methods include survey methods, laboratory experiments and numerical methods such as mathematical modelling (see Chapter 2).
Quasi-field study	A technique of fact-finding or validation having some the features of the field-study technique (see Chapter 12).
Research question	A stimulus to research. A basic question that seeks an answer through the medium of research.
Robustness	A property of flexibility that allows a system or application to cope with unforeseen changes (e.g. the

actions of rivals) to the environment or operating conditions (see Chapter 8).

Scenario	A description of a possible set of circumstances, probably hypothetical, but possibly real, often presented in the form of a short case study (see Chapter 9).
Semiotics	A discipline that is primarily concerned with the meaning of signs and symbols in language in testing a theory or understanding a research subject. The importance of an idea is revealed by the frequency with which it appears in the text (see Chapter 8).
SLIM	Strategic Linkage Model. The conceptual model that underpins SLIM/SLIP, the proposed method for linking business strategy to the development of strategic IS/IT applications.
SLIM/SLIP	The proposed method for linking business strategy to the development of strategic IS/IT applications. The major deliverable of the research project.
SLIP	Strategic Linkage Process. The dynamic process that enacts SLIM/SLIP, the proposed method for linking business strategy to the development of strategic IS/IT applications.
Strategy	See Chapter 1 for a full definition.
Strategic IS/IT application	See Chapter 3 for a full definition.
Support	(As in support for strategy). The extent to which a strategic IS/IT application enables a strategy to be enacted, manoeuvres to be carried out or strategic targets to be achieved.
Technique	See Chapter 1 for a full definition.
Theory	A set of conditions that are held to have general validity (i.e. to apply in a sufficient number of circumstances) and to be of practical use on other occasions in other places (see Chapter 12).
Thrust	(Also strategic thrust). A tactical manoeuvre towards a particular target, often as part of a framework (see Chapter 7).

Validity

A property of a sound theory. A state that exists when a theory has been tested and found to apply generally and to have a practical application (see Chapter 12).

Vision

(As in strategic vision). A description of desired future state of an organisation as represented by its goals, structure and functions. Although the vision is a concept (i.e. it exists in people's minds), it must be articulated through the vision process and may be represented by a scenario or model (see Chapter 8).

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Appendix A - Case Studies of Strategic IS/IT Applications

This appendix contains brief *precis* of the eight commonly-described strategic IS/IT applications used for the initial review in Chapter 7. It is not intended to describe the systems in great detail, but to provide an appreciation that will help in the understanding of the features examined in Figure 7.2. More information about the cases may be obtained from the references.

1. American Airlines' Sabre

The Sabre system evolved gradually over a period of more than twenty years from an internal reservation processing and inventory control system to a strategic information system. Sabre now supports links to travel agents that are used by other airlines, allows flight booking over the Internet, maintains the records of AA's frequent flier programme (AAdvantage) and provides AA's management with information on topics as diverse as financial yield, crew scheduling and aircraft routing and maintenance. Sabre has undergone many enhancements and developments as AA's strategic managers saw opportunities and sought to pre-empt the actions of competing airlines. A period of intense competition in the US airline industry occurred in the late 1970s and early 1980s in the period leading up to deregulation. When attempts the US civil aviation authority to promote an industry-wide IT-based reservation system broke down, the two major airlines engaged in a 'race' to develop their own systems. AA came to dominate the industry when it allowed other airlines to use Sabre for a fee. The strategic success of Sabre led to a series of unsuccessful 'antitrust' actions against AA in the US House of Congress. the IT function of AA has since been devolved into an autonomous division (Sabre Technologies Inc.) which is a major source of AA's revenue and which has supported AA through difficult times in the airline industry as in 1995 and 1996. The AA Sabre system shows clear evidence of the strategic vision, strategic positioning, strategic flexibility and strategic alignment components being present in the linkage between its business strategy and the development and refinement of Sabre. It is probably the most successful and certainly the most reported strategic IS/IT application in history

Button, K. (1995) American Airlines: Pulling Out of a Dive. *Computer Weekly*, November 16th, pp. 54-55.

Copeland, D.G. and McKenney, J.L. (1988) Airline Reservation Systems; Lessons from History. *MIS Quarterly*, 12, pp. 353-370.

Hopper, M. (1990) Rattling Sabre: New Ways to Compete on Information. *Harvard Business Review*, 68(3), pp. 118-125.

Monterio, L. and Macdonald, S. (1994) From Efficiency to Flexibility: the Strategic Use of Information in the Airline Industry. *Journal of Strategic Information Systems*, 5, pp. 169-188.

Targett, D. (1993) *Strategic Information Systems*. Distance Learning Masters Programme, Herriot-Watt University, Edinburgh.

United States House of Congress (1993) *National Commission to Ensure a Strong Competitive Airline Industry: Change, Challenge and Competition*. GPO, Washington, DC.

United States House of Congress (1988) *Airline Computer Reservation Systems: Hearing of the Subcommittee on Aviation in Public Works and Transportation*. Committee on Public Works and Transportation, House of Representatives, Washington, DC.

2. American Hospital Supply Corporation's (later Baxter Travenol's) ASAP

The ASAP (Analytical Supply and Purchasing) system was originally developed in the early 1970s to solve the specific operational problem of incomplete orders and late deliveries in relation to one major customer. AHSC saw the potential advantages of sharing an automated order entry and tracking system with its customers and began to extend the system to hospitals over a wide geographical area. The system was enhanced progressively as AHSC sought to protect this customer base and a wide range of features were added. AHSC was eventually taken over by Baxter's, with the acquisition of the ASAP strategic IS/IT application being an important part of the deal. The ASAP case shows some evidence of strategic vision in the linkage between its business strategy and the development of ASAP, but there is much stronger evidence of strategic positioning and strategic alignment being important as the organisation was in effect 'built around' the evolving system.

King, W.R., and Saberwhal, R. (1992) The Factors Affecting Strategic Information Systems Applications: an Empirical Assessment. *Information and Management*, 23, pp. 217-235.

Neo, B.S. (1988). Factors Facilitating the Use of Information Technology for Competitive Advantage: an Exploratory Study. *Information and Management*, (15) pp. 191-201.

3. Citicorp's ATM and GTN

Citicorp in the US was the first bank to develop a public ATM system. The system grew out of an internal DP system that was designed to automate low-margin, small-volume branch transactions. Citicorp had some experience of strategic IS/IT application development as it already lead the field with its Global Transaction Network (GTN) which was also originally developed to fulfil internal organisational needs - the connection of Citicorp's remote centres to its corporate headquarters. Later the ATM network was developed to provide world-wide investment information to international banking and dealing centres. The Citicorp case shows some evidence of strategic vision and strategic flexibility as important components of the linkage between its business strategy and the development of its strategic systems, but strategic flexibility and strategic alignment are clearly very important due to the way the systems are adapted to serve emerging strategies and to support radically different business processes.

King, W.R., and Saberwhal, R. (1992) The Factors Affecting Strategic Information Systems Applications: an Empirical Assessment. *Information and Management*, 23, pp. 217-235.

Neo, B.S. (1988). Factors Facilitating the Use of Information Technology for Competitive Advantage: an Exploratory Study. *Information and Management*, (15) pp. 191-201.

Eardley, W.A., Lewis, T., Avison, D.E. and Powell, P. (1996) The Linkage Between IT and Business Strategy in Competitive Systems: a Reappraisal of Some 'Classic' Cases Using a Competition Analysis Framework. *International Journal of Technology Management*, 11(3/4), pp. 395-411.

4. Federal Express Corporation's PRISM and COSMOS

Federal Express is an example of a company that has shown a clear awareness of the strategic implication of IT since its founding in 1973. There is evidence that the company's strategic managers identified and planned the role that IS would play in their business from the beginning, alongside other automation technologies appropriate to a major logistical enterprise. As its scale of operations grew and its range of services proliferated in an increasingly competitive market, Federal invested more and more heavily in new technology and diversified the uses of its IS into strategic management. Federal Express is a good example of a company that developed a vision that included IT, used IT to secure carefully-considered strategic positions in its industry and aligned its strategies and infrastructures effectively to anchor IT in its core business. Its COSMOS package management, routing and tracking system can be said with some justification to have made the 'overnight delivery' industry possible on a continental scale, and its PRISM human resource management system is regarded as one of the seminal applications of a strategic system in the field. The Federal Express case shows strong indications of the importance of all four strategic components in the linkage between its business strategy and the development of its strategic systems. COSMOS remains one of the most successful IS/IT applications and one of the most influential systems in its industry sector.

Avison D.E., Eardley, W.A., Powell, P. (1996) How Strategic are Strategic Information Systems? Australian Journal of Information Systems, 4(1), pp 11-20.

Palvia, P.C., Perkins, J.A. and Zeltmann, S.M. (1992) The PRISM System: a Key to Organisational Effectiveness at Federal Express Corporation. MIS Quarterly, September, pp. 277-292.

5. Merrill Lynch's CMA

The idea for Merrill Lynch's Cash Management Account (CMA) was originally among a list of ideas for systems developments that were submitted to by the Stanford Research Institute to help the company reverse a decline in the performance of its investment sector. One of the reasons for Merrill Lynch taking up the idea of a combined brokerage service, investment and current account and credit card system was that it had a surplus of computing capacity with which to carry out the complex data processing needed to manage such accounts. The company's strategic use of IS/IT developed from this move to use IT efficiently in a way that owed much to the relative slowness of competitors to perceive the opportunities that IT provided in the sector. There were numerous legal and technical problems that delayed the implementation of the CMA system by some three years, but even so Merrill Lynch was the first to deploy such a system, which secured it a 90% share of the market almost immediately and remained virtually unopposed for five years. The system also featured a technological collaboration with Banc One, which had a distinctive competence in banking IS and was partnering some of Merrill Lynch's competitors in similar ventures! Merrill Lynch is an example of a company that gains a sustained competitive advantage by developing a business idea that places it into a dominant strategic position and holds it there by erecting structural barriers to entry. Little infrastructural flexibility was needed as the CMA system was relatively stable once developed. The Merrill Lynch CMA case is an enigma for several reasons. First, it

shows the importance of the strategic vision component, although that vision was not a part of the company's strategy and was provided by 'outsiders'. Second, the strategic positioning component is clearly important, although the availability of the technology (e.g. from consultants) should have made the barriers to entry much more temporary than they proved to be. The strategic flexibility and strategic alignment components are identifiable in the case, but are not considered to be of great importance as the system remained relatively stable and was not particularly 'integrated' into Merrill Lynch's infrastructures or functional strategies. This leads to the observation that CMA is in fact a transactional system that acquired strategic importance. It could also lead to the identification of a fifth component of the linkage between business strategy and strategic systems development - strategic luck!

Andreu, R., Ricart, J.E. and Valor, J. (1991) The Strategic Dimension of Transactional Information Systems: Some Organisational Implications. *Journal of Information Systems*, 1(4), pp. 223-232.

Brady, T. and Targett, D. (1995) Strategic Information Systems in the Banking Sector: Holy Grail or Poison Chalice? *Technology Analysis and Strategic Management*, 7(4) pp. 387-406.

Neo, B.S. (1988). Factors Facilitating the Use of Information Technology for Competitive Advantage: an Exploratory Study. *Information and Management*, (15) pp. 191-201.

5. McKesson Corporation's Economost

The Economost system has many of the features of AHSC's ASAP, in that it provides order entry, tracking and stock control information through technology 'donated' to the customer. In this case the user group consists of pharmacies and drugstores rather than hospitals. It is said that Economost was the brainchild of one man, McKesson's vice president Wilson Nolen, who first conceived the idea for a large-scale DP system in the late 1960s. The original internal system was not a success and came close to being terminated when Nolen left the company in the early 1970s. Between 1970 and 1975 Economost was used on a limited basis for the most popular stock lines in a limited geographical area. As with Merrill Lynch's CMA the stimulus to exploit the strategic possibilities of the system may have come from consultants who were called in to identify ways of reversing the declining fortunes of the company. The decision to use the system on a nation-wide basis as the main means of capturing customer orders was made in 1975 in the face of opposition from at least one senior executive officer. It was left to David Malmberg, then Director of Strategic Planning, to justify the considerable investment in the system in strategic terms. The key to the systems' success was to use it as a way of redefining the relationship between McKesson and the network of small pharmacies and drugstores that make up its customer base. Once included in this business network switching costs and barriers to entry ensured that customers remained 'loyal' even as the strategies and infrastructures underwent considerable changes. There is no doubt that Economost has been instrumental in McKesson regaining a successful profile in the pharmaceuticals distribution market, even though the disruption to internal infrastructures and processes has at times been extremely unpopular within the company. The McKesson case shows clear evidence of the strategic positioning and strategic alignment components in the linkage between its business strategy and the development of Economost. The presence of the strategic vision and strategic flexibility components is less obvious, as the strategy behind the

system was emergent and Economost was so successful that flexibility was not much required. It can, of course, be argued that McKesson's arrival at its strategic vision was due to luck, and that Economost succeeded because McKesson's strategic position was so strong *vis a vis* its dispersed and relatively powerless customer base.

Clemons E.K. and Row, M.C. (1988) McKesson Drug Company: a Case-study of Economost: a Strategic Information System. *Journal of Management Information Systems*, 5(1), pp. 37-50.

Targett, D. (1993) *Strategic Information Systems*. Distance Learning Masters Programme, Herriot-Watt University, Edinburgh.

7. Philadelphia National Bank's MAC System

The MAC shared ATM system was launched by PNB as part of a strategic plan in response to the introduction of George, the first major ATM system in Philadelphia, by rival Girard in 1976. By using the fact that MAC was a shared system and could be used by other banks PNB was able to overcome Girard's first-mover advantage. Like Merrill Lynch, PNB had a minor presence in the retail banking sector and therefore had to overcome regulatory problems in order to implement the system. MAC 'went live' in 1979 and quickly became viable with 13 smaller banks as participants in the system including Fidelity Bank, which at the time was a significant player in Philadelphia banking, having about half the net income of PNB itself. Key points in the development of MAC were when Germantown Savings Bank and Provident National Bank joined the network. The former had an unusual record of technological innovation (like Banc One in the Merrill Lynch case) but lacked the resources to proceed with an ATM network alone. The latter was already the largest independent network operator when the decision was made in 1985 to join the PNB system, probably due to MAC's technical superiority. The addition of Provident's ATMs to the system increased MAC's operating base from just over 400 to almost 500 installed machines, making it the dominant network in the region. The consolidation of PNB's success came when it acquired the Cashstream ATM network from Mellon Bank, which had taken over Girard several years earlier and had incorporated George into its own system, which was by then only slightly smaller than MAC. Thus, doubling the size of the network by the early 1990s secured strategic success for PNB, a success which was consolidated throughout that decade. There is clear evidence of the strong presence of the strategic vision and strategic positioning components in the linkage between PNB's business strategy and the development of MAC. PNB pursued a visionary strategy of growth based on a clear awareness of the importance of its strategic system in establishing and sustaining a competitive position in the banking industry. There is no doubt that MAC gave PNB an extraordinary degree of success, allowing it to change the basis of competition in the industry and to 'neutralise' rivals of almost its own size with relative ease. The alternative would have been a more costly and less certain 'traditional' strategy of growth by acquisition.

Avison D.E., Eardley, W.A., Powell, P. (1996) How Strategic are Strategic Information Systems? *Australian Journal of Information Systems*, 4(1), pp 11-20.

Neo, B.S. (1988). Factors Facilitating the Use of Information Technology for Competitive Advantage: an Exploratory Study. *Information and Management*, (15) pp. 191-201.

8. United Airlines' Apollo

United Airlines' Apollo system has many features that are similar to AA's Sabre system, in that it provides on-line reservation facilities for travel-related services, including flights, hotel reservations and car hire. The system is also a source of revenue as a 'carrier' of booking information and transactions for other airlines. Apollo also offers office automation facilities that are intended to be attractive to travel and booking agents. The Apollo system may be considered to be a limited success. Although due to United's weaker vision and less flexible systems development processes, Apollo ultimately failed to enable United to compete with AA in its particular market, and United failed in leading an 'antitrust' action against AA, the two systems came to coexist by focusing on different geographical areas. The United Airlines case demonstrates the importance of the strategic vision, strategic positioning and strategic flexibility components of the linkage between business strategy and strategic systems development. United lacked the clarity of vision to profit from the sudden changes in the US airline industry in the way that AA did. Once AA 'had the lead' in the sector with Sabre and had established it as the major 'channel of delivery' of airline services, United was not able to develop new features in Apollo quickly or flexibly enough to effect its strategic position *vis a vis* AA.

Ciborra, C. (1991) The Limits Of Strategic Information Systems. *International Journal of Information Resource Management*, 2 (3), pp. 11-17.

Copeland, D.G. and McKenney, J.L. (1988) Airline Reservation Systems; Lessons from History. *MIS Quarterly*, 12, pp. 353-370.

Vitale, M.R. (1984) United Airlines. *Harvard Business School Case Study*. 9-184-83.

Monterio, L. and Macdonald, S. (1994) From Efficiency to Flexibility: the Strategic Use of Information in the Airline Industry. *Journal of Strategic Information Systems*, 5, pp. 169-188.

United States House of Congress (1993) *National Commission to Ensure a Strong Competitive Airline Industry: Change, Challenge and Competition*. GPO, Washington, DC.

United States House of Congress (1988) *Airline Computer Reservation Systems: Hearing of the Subcommittee on Aviation in Public Works and Transportation*. Committee on Public Works and Transportation, House of Representatives, Washington, DC.

Appendix B - Publications Resulting From This Research

The following published material, presented in reverse date order, was produced by the researcher as a part of this doctoral research project. The part of the thesis to which the publication relates is indicated thus (e.g. **Chapter 7**) after the citation. The nature of the published article is described by the following key:

Key:

- * The main body of the work was done by the researcher with the supervisors playing an advisory or editorial role;
- © There was an equal degree of collaboration with other researchers, and a substantial amount of material from the present research was contributed;
- ®® The publication was submitted to a rigorous refereeing process;
- ® There was an editorial or refereed selection of material for inclusion, but with less rigour than the above.

* ®® Avison, D.E., **Eardley, W.A.** and Powell, P. (1998) Suggestions for Capturing Corporate Vision in Strategic Systems. *Omega - the International Journal of Management Science*, 26(4), pp. 443-459. (**Chapter 9**).

* ® **Eardley, W.A.**, Avison, D.E. and Powell, P. (1998) *Developing Flexible Strategic Information Systems*. Proceedings of the 8th Annual BIT Conference, BIT '98, Business Information Management: Adaptive Futures, November, Manchester. (**Chapter 8**).

* ®® **Eardley, W.A.**, Avison, D.E. and Powell, P. (1997) Developing Information Systems to Support Flexible Strategy. *Organisational Computing*, 7(1), pp. 57-77. (**Chapter 8**).

* ® **Eardley, W.A.**, Avison, D.E. and Powell, P. (1997) *Capturing Strategic Vision in Information Systems*. In Friedman, K. (Ed.) *Innovation and Management: Recent Research on Generating New Ideas*. EFMD Publications, Brussels, pp. 1-18. (**Chapter 9**)

© ® Gao, Z.L., Liu, K. and **Eardley, W.A.** (1997) *A Framework for Identifying Opportunities to Use Strategic Information Systems: an Application in the World Banking Sector*. Proceedings of the Information Resource Management Association International Conference, August, Vancouver. (**Chapter 10**).

© ®® Loebbecke, C., Powell, P., **Eardley, W.A.**, Avison, D.E. Jelassi, T. (1997) The Limits to DSS: Supporting Vision, Creativity and Future Thinking. *Journal of Decision Systems*, December, 6(4), pp. 317-331. (**Chapter 9**).

* ®® Avison D.E., **Eardley, W.A.**, Powell, P. (1996) How Strategic are Strategic Information Systems? *Australian Journal of Information Systems*, 4(1), pp 11-20. (**Chapter 7**).

* ® **Eardley, W.A.**, Lewis, T., Avison, D.E. and Powell, P. (1996) The Linkage Between IT and Business Strategy in Competitive Systems: a Reappraisal of Some

'Classic' Cases Using a Competition Analysis Framework. *International Journal of Technology Management*, 11(3/4), pp. 395-411. **(Chapter 7).**

* ® **Eardley, W.A.**, Lewis, T., Avison, D.E. and Powell, P. (1995) *An Examination of the Links Between IT and Business Strategy: Using a Strategy Framework to Re-examine Some 'Classic' Business Applications*. Proceedings of the 5th International Forum on Technology Management: Closing the Gap Between Technology and Business Strategy, June, Espoo, Finland. **(Chapter 7).**

* ® **Eardley, W.A.**, Avison, D.E. and Powell, P. (1995) *Capturing Strategic Vision in Information Systems*. International Conference of the European Fund for Management Development, August, Warwick. **(Chapter 9).**

* ® **Eardley, W.A.**, Avison, D.E. and Powell, P. (1995) *An Examination of the Links Between Vision-based Strategy and Information Technology Developments*. Proceedings of the 5th Annual BIT Conference, BIT '95: Sharing Visions and Values, November, Manchester. **(Chapter 9).**

Appendix C - Covering Letter and Survey Questionnaire

Dear

At Staffordshire University we are always seeking to expand our knowledge base and to benefit the academic and business communities through applied research. To this end I am undertaking doctoral research into the linkage between the business strategy and strategic information systems and information technology (SIS/IT) applications in top companies. The objective of this project is to examine the ways in which organisations are linking IS development to strategic objectives, to assess the effectiveness of current SIS/IT development techniques and to collect information regarding 'best practice' in the area. The outcome of the research will be a framework or method for developing SIS/IT applications that helps to ensure their support for business objectives and the achievement of real business benefits.

The initial phases of the research are conducted by questionnaire and seek to identify categories of SIS and to collect and analyse information about the current use of management frameworks and development techniques. Later phases will involve direct contact between the University and selected organisations, to validate the proposed linking method. It is inevitable that some of the findings of the research will be sensitive from a commercial point of view, and requests for confidentiality will be respected in a number of ways:

- A guarantee is given that no such confidential information will be communicated from one participating organisation to another;
- The results of statistical surveys will not include identifiable reference to specific organisations in published form;
- In more detailed publications the identity of organisations will be concealed by the use of pseudonyms and by care being taken not to disclose facts which might lead to the organisations being recognised.

We hope that you will take the time to complete and return the enclosed questionnaire (it should take about 30 minutes). If your organisation has experience of linking IS development to business strategy, but you are not directly involved in this area, please pass the questionnaire to the person or people in your organisation who you feel can best provide the information. A set of guidelines for completing the questionnaire is provided overleaf. Your response and your time is much appreciated.

Yours Sincerely

Alan Eardley
Head of IT for Strategic Management



IT FOR STRATEGIC MANAGEMENT GROUP

Linking Business Strategy and Strategic IS/IT Applications A Survey of Current Practice in Top UK Companies

This questionnaire seeks to elicit the experience of executives, strategic managers and IT managers who have experience of linking their organisation's business strategy to the development of its strategic information systems. The target population for the survey is companies on the 'FT Extel 1000' list for 1995-1996.

Some of the designated officers to whom the questionnaire is addressed may not have direct experience of linking business strategy to the development of strategic systems. If you are in this category, please pass the to the most appropriate person in your organisation to respond to this issue.

If you represent a holding company that does not itself develop strategic information systems or strategic IT applications, please pass the questionnaire to the most appropriate officer in one of the companies in your group that does so.

Instructions to Respondents

To save your time most of the answers are 'indicative' - they simply require a tick in the relevant box. Some require an indication on a simple four point scale to record degree (e.g. of agreement or involvement). In some cases a minimum of 'free form' input is required. It is not necessary to take time to consider your replies - please give your immediate reaction to each of the questions. It is intended to publish some of the results of the survey in a doctoral thesis and in academic journals. **You may wish to preserve your own anonymity and/or that of your organisation. To do so, please tick one or both of the boxes below:**

I wish to remain anonymous (your details are still required for contact purposes).

☐

I wish the identity of my organisation to be disguised (a pseudonym will be used).

☐

As a follow-up to this questionnaire it is intended to involve some respondents in a short series of interviews. This will be at the respondents' own convenience, **but if you do not wish to be involved, please tick the box below:**

I do not wish to be involved in interviews as a follow-up to this questionnaire.
(You may still be contacted, but only to clarify some part of your response).

☐

Please tick this box if you wish to receive a complimentary copy of any publication.

☐

Please return the completed questionnaire by the 30th August 1996 to:

Alan Eardley
Head of ITSM
Staffordshire University
Beaconside
Stafford ST16 3YL

Tel: 01785 353456

Fax: 01785 353497

E-mail: W.A.Eardley@soc.staffs.ac.uk

Section 1.**Personal Details**

Some basic details about yourself. These details are helpful in classifying your return.

Your name Dr./Mrs./Ms./Mr.
Your job title
Department
Company Name
Address 1
Address 2 Postcode

1a. Which of the following best describes your job role or function? (Tick one)

• Chief executive officer.	☐	• Middle, line or tactical manager.	☐
• Board-level or strategic manager.	☐	• Advisor or consultant, staff role.	☐

Other role (please name):

1b. How many reporting levels are there between you and the CEO of your firm? (Tick one)

None	One	Two	Three	Four or more
☐	☐	☐	☐	☐

1c. Do you have responsibility for setting or managing a strategy? (Tick one)

Yes	No
☐	☐

If you answered 'Yes' to the above, which best describes the strategy involved? (Tick one)

• The (corporate) strategy for a conglomerate or single organisation.	☐
• The strategy for a division or strategic business unit (SBU).	☐
• The strategy for IT infrastructure.	☐
• The strategy for IS applications.	☐
• A (non-IS/IT) functional strategy (e.g. marketing, human resources or finance).	☐

(Please name functional strategy):

1d. Indicate the extent of your regular involvement in these strategic activities: (Tick one)

	Much	Some	Little	None
• Setting the corporate or business strategy.	☐	☐	☐	☐
• Aligning the IS or IT strategy with the business strategy.	☐	☐	☐	☐
• Aligning the IT strategy with the IS strategy.	☐	☐	☐	☐
• Aligning another business strategy with the IS/IT strategy.	☐	☐	☐	☐

Please name the other strategy involved:

Section 2.

IS & IT in your Company

This is to assess your organisation's approach to information systems and information technology (jointly termed IS/IT) in terms of the planning, development and operation of these functions.

2a. Which of the following is in place formally in your organisation ?

(Tick any)

- A long-term plan for the IT infrastructure (or IT strategy).
- A managed IS 'applications portfolio'.
- A process for identifying business opportunities to develop IS/IT applications.
- A strategic information systems plan (or IS strategy).
- A method for linking the business strategy to the IS and/or IT strategies.
- A method for selecting IS/IT projects which match the IS/IT strategy.
- A method for auditing existing IS/IT systems to measure their performance.

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2b. Which of the following best describes the current predominant role of IS/IT in your firm?

(Tick one)

- An administrative support to the business - has little direct impact, relatively low investment, occasional top management involvement.
- Crucial to current business operations, but not at the 'leading edge' of the company's strategic planning and development process.
- An integral part of the business and of its future strategy - IS/IT is certain to shape the company's long-term growth or survival.
- Not important to the business at the moment, but likely to become so in the foreseeable future (i.e. within your current planning cycle).

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2c. Please rate your agreement with the following statements about how your top management views the functions of IS/IT in your firm.

(Tick one for each point)

Agreement: Much Some Little None

- The strategic potential of IS/IT is well recognised and IS/IT is regarded as an important competitive force.
- IS/IT management is regarded as having an importance at least equal to the management of other business areas.
- IS/IT issues are felt to be crucially important by other business areas and are often discussed by them.
- Every effort is made to involve IS/IT managers in top level decision-making and strategy-setting processes.
- The IS/IT strategy is linked successfully to the business strategy and the strategies of other business functions.
- IS/IT management is a separate issue from the management of other business functional areas.

Agreement:	Much	Some	Little	None
• The strategic potential of IS/IT is well recognised and IS/IT is regarded as an important competitive force.	☐	☐	☐	☐
• IS/IT management is regarded as having an importance at least equal to the management of other business areas.	☐	☐	☐	☐
• IS/IT issues are felt to be crucially important by other business areas and are often discussed by them.	☐	☐	☐	☐
• Every effort is made to involve IS/IT managers in top level decision-making and strategy-setting processes.	☐	☐	☐	☐
• The IS/IT strategy is linked successfully to the business strategy and the strategies of other business functions.	☐	☐	☐	☐
• IS/IT management is a separate issue from the management of other business functional areas.	☐	☐	☐	☐

Section 3.

Strategic & Market Factors

This is to find out some facts about the environment and market in which your organisation operates, its attitudes and the strategies which it adopts to use IS/IT in response to competitive pressures.

3a. Which of the following best describes some important features of your organisation's market and/or business sector? (Tick any)

- There is intense competition in the market.
- IT is often used as a means of strategic collaboration.
- There is a history of businesses entering the market frequently.
- New participants often use IT applications to enter the market.
- Many new products & services use innovative IT applications.
- It is a buyers' market - customers have a lot of influence.
- Suppliers of goods & services have considerable bargaining power.
- IT is the dominant way of delivering goods & services.
- Business strategies depend on IT for their implementation.
- IT has the potential to provide new strategic opportunities.
- IT has no impact on suppliers, competitors or rivals.

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3c. Which of the following best describes your firm's main strategy?

(Tick one)

- Cost leadership - competing by offering cheaper products or services.
- Differentiating your products or services from those of the competition.
- Innovation -aiming new products or services aimed at an identified niche.
- Growth by self-generated expansion - creating business opportunities.
- Growth through the creation of business partnerships and alliances.

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3d. Rank the following attributes in terms of their importance to your firm's corporate strategy at the present time.

Rank by entering number in box (4 = High, 1 = Low)

- 'Strategic position' - achieving & sustaining advantage over rivals, dominating the market, maintaining a position of competitive advantage.
- 'Strategic flexibility' - being able to change strategic direction over time, absorbing unpredictable environmental and economic influences.
- 'Strategic vision' - foreseeing a desired future situation or goal and setting objectives that will allow the firm to move towards that goal.
- 'Strategic alignment' - linking the various business functional strategies (e.g. marketing, finance, human resources) the overall corporate strategy.
- 'Value chain integration' - exploiting vertical integration by forging permanent links with business 'allies' (e.g. suppliers & customers).

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Section 4. Strategic Application of IS/IT.

Some questions about your definition of 'strategic' IS/IT and your organisation's approach to and experience of developing and operating IS/IT applications that are of strategic importance.

4a. Has your organisation developed a strategic information system (SIS) or an IS/IT application that it generally considers to be of strategic importance to the business?

Yes

☐

No

☐

If you answered 'No' to the above please answer only the rest of Question 4a. and return the part-completed form to the address on the front page of the questionnaire.

If you answered 'Yes' please carry on filling in the questionnaire from Question 4b.

Why has your organisation not developed or is not operating a SIS or IS/IT application which it would consider to be strategic?

**application
(Tick any)**

- It does not consider such an IS/IT application to be appropriate
- It is planning such an IS/IT application in the future
- It has not yet identified an opportunity to develop such a system
- It feels that it lacks the necessary staff skills
- It feels that it lacks access to the necessary technology
- It regards the development of such systems as being too 'risky'
- It regards the development of such systems as being too 'costly'
- It feels that such systems do not achieve the benefits which are expected
- It feels that the advantage of such systems are often temporary

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Please answer the rest of the questions in this section if you answered 'Yes' to Q 4.a.

4b. Why do you consider the system referred to in Question 4.a. to be 'strategic' to your firm?

Rate your agreement with the following statements:

(Tick one of each)

Agreement:

Much

Some

Little

None

- The organisation could not exist without it
- It is at the core of the primary business activities
- It has a high impact on the organisation's operations
- It allows business collaboration to take place
- It is an innovative means of delivering a product/service
- It is necessary to compete with your organisation's rivals
- It supports the processes of strategic management
- It is closely linked to the organisation's business strategy
- It has transformed the organisation's business processes

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☐	☐	☐	☐
☐	☐	☐	☐
☐	☐	☐	☐
☐	☐	☐	☐
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☐	☐	☐	☐
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4c. Which of the following type of system best describes the main strategic IS/IT application(s) identified in Question 4.a.? (Tick any)

- An electronic data interchange (EDI) or 'paperless trading' system which aids the exchange of trading data (e.g. orders/payments etc.) with suppliers or customers ☐
- An 'inventory/availability' system which aids the ordering and supply of physical goods or services (e.g. a just-in-time system or an agency booking system) ☐
- An inter-organisational information system which allows you to share processes or business functions with partner firms or 'allies' (e.g. design and tooling information) ☐
- An inter-organisational information system which aids the sharing or exchange of information, expertise, or business knowledge with partner firms or 'business allies' ☐
- A data processing or transaction processing system which operates at the core area(s) of your business and is indispensable to it ☐
- An executive information system (EIS) which aids your firm's strategic management and/or decision-making processes ☐
- A system which is intended to transform the company's organisational structure and/or business processes (e.g. BPR) ☐

4d. Which of the following types of business strategy is the strategic IS/IT application identified in Question 4a. intended to support? (Tick any)

- 'Strategic position' - achieving & sustaining advantage over rivals, dominating the market, maintaining a position of competitive advantage. ☐
- 'Strategic flexibility' - being able to change strategic direction over time, absorbing unpredictable environmental and economic influences. ☐
- 'Strategic vision' - foreseeing a desired future situation or goal and setting objectives that will allow the firm to move towards that goal. ☐
- 'Strategic alignment' - linking the various business functional strategies (e.g. marketing, finance, human resources) the overall corporate strategy. ☐
- 'Value chain integration' - exploiting vertical integration by forging permanent links with business 'allies' (e.g. suppliers & customers). ☐

4 e. Rate your opinion of the success of the strategic IS/IT application identified in Question 4a. in support of the following strategic components as identified and described above?

Degree of agreement:	Much	Some	Little	None
• ' <u>Strategic position</u> ' - achieving & sustaining advantage etc.	☐	☐	☐	☐
• ' <u>Strategic flexibility</u> ' - being able to change strategic direction etc.	☐	☐	☐	☐
• ' <u>Strategic vision</u> ' - foreseeing a desired future situation or goal etc.	☐	☐	☐	☐
• ' <u>Strategic alignment</u> ' - linking the various business strategies etc.	☐	☐	☐	☐
• ' <u>Value chain integration</u> ' - exploiting vertical integration etc.	☐	☐	☐	☐

Section 5. Development of the System

This is to record your organisation's experience of developing the strategic IS/IT application described in Section 4 and your assessment of the process of developing the system.

5a. Which of the following best describes the source of the original idea behind the development of the strategic IS/IT application identified in Question 4a? (Tick one)

The CEO
☐

The Board
☐

IS/IT Director
☐

IS/IT Manager
☐

IS/IT Committee
☐

Other (please name):

5b. Which of the following best describes the way the background against which the IS/IT application identified in 3.a was originally produced? (Tick any)

- As a part of a long-term, 'top level' strategy for all IS/IT applications
- As a part of a review of strategic IS/IT applications
- As a result of managing the overall IS/IT applications portfolio
- From a business opportunity identified in isolation
- An exercise involving the advice of external consultants
- To fall into line with a parent company's systems or standards
- As a result of pressure from users in (a) business functional area(s)
- As a result of requests from business allies (e.g. suppliers or customers)

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Other (please name):

5c. What were the primary reasons behind the initial development of the strategic IS/IT application identified in 3.a? (Tick any)

- To achieve & sustain a pre-emptive or 'first-mover' advantage over rivals
- To exploit or maintain an existing business advantage in your market
- To improve your ability to maintain and supply your customers
- To improve your suppliers value, quality or service to your firm
- To find ways to enter a new market sector protected by rivals
- To prevent potential rivals from entering your market
- To provide an alternative to an existing product or service
- To act as an innovative product or service in your firm's market
- To gain future experience of strategic IS/IT (i.e. organisational learning)

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Other (please name):

Please indicate which of the following major activities were involved in the development of the strategic IS/IT application described in Section 4, and which (if any) of these techniques were used.

5d. Developing the business strategy or identifying the business opportunities.

Was this stage present in the development of the system?

Yes

No

☐
☐

If you answered 'Yes' please answer the rest of this question:

Which of the following techniques were used at this stage?

(Tick one)

- Michael Porter's 5 Forces of industry competition analysis model.
- Michael Porter's value chain analysis model.
- J. Stuart Evans' strategic flexibility conceptual framework.
- An 'in-house' method (i.e. formal, but developed by your own firm)

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(please name and describe briefly):

- Other (please name & state source):

☐

If no formal technique was used to support this stage please indicate here:

5e. Identifying 'high-impact' systems in the firm's portfolio of potential IS/IT applications

Was this stage present in the development of the system?

Yes

No

☐
☐

If you answered 'Yes' please answer the rest of this question:

Which of the following techniques were used at this stage?

(Tick one)

- Warren McFarlan's strategic grid technique.
- Greg. Parson's strategic IT mapping technique.
- An 'in-house' method (i.e. formal, but developed by your own firm)

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(please name & describe briefly):

- Other (please name & name source):

☐

If no formal technique was used to support this stage please indicate here:

5f. Identifying the potential to use IS/IT to support a strategic move or business opportunity.

Was this stage present in the development of the system?

Yes

No

☐
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If you answered 'Yes' please answer the rest of this section:

Which of the following techniques were used at this stage?

(Tick one)

- Michael Earl's strategic frameworks model.
- Greg. Parson's potential opportunities grid technique.
- Learmonth & Burchett's customer resource lifecycle technique.
- An 'in-house' method (i.e. formal, but developed by your own firm)

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(please name & describe briefly):

- Other (please name & name source):

☐

If no formal technique was used to support this stage please indicate here:

5g. Linking the business strategy with the IS and/or IT strategy.

Was this stage present in the development of the system?

Yes	No
☐	☐

If you answered 'Yes' please answer the rest of this section:

Which of the following techniques were used at this stage?

(Tick one)

- The MIT 90s Strategic Alignment Model (SAP).
- Charles Wiseman's strategic options generator.
- IBM's Business Systems Planning (BSP) technique.
- An 'in-house' method (i.e. formal, but developed by your own firm)

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(please name & describe briefly):

- Other (please name & name source):

If no formal technique was used to support this stage please indicate here:

☐

5h. Linking the IS and/or IT strategy to the IS applications development.

Was this stage present in the development of the system?

Yes	No
☐	☐

If you answered 'Yes' please answer the rest of this section:

Which of the following techniques were used at this stage?

(Tick one)

- John Burch's strategic information systems planning (SISP) method
- James Martin's Information Engineering (IE) methodology
- An 'in-house' method (i.e. formal, but developed by your own firm)

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(please name & describe briefly):

- Other (please name & name source):

If no formal technique was used to support this stage please indicate here:

☐

5i. Identifying & planning the benefits to be achieved by the proposed system.

Was this stage present in the development of the system?

Yes	No
☐	☐

If you answered 'Yes' please answer the rest of this section:

Which of the following techniques were used at this stage?

(Tick one)

- IBM's SESAME systems evaluation method
- A 'financial' method (e.g. payback, NPV or IRR)
- The Index Foundation's Index Matrix
- The 5 -Level Transformation Graph
- An 'in-house' method (i.e. formal, but developed by your own firm)

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(please name & describe briefly):

- Other (please name & name source) :

If no formal technique was used to support this stage please indicate here:

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Thank you for completing the questionnaire - please return it to the address on the front page.