The attributes of information as an asset

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The attributes of information as an asset.

by

Joan Stenson

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ABSTRACT

Attempts to identify information as an asset has led to an increased awareness of the role of information in enhancing organisational performance. Central to this role is the identification of attributes of information assets which include quality, utility, productivity, effectiveness and financial and economic aspects. Measurement of attributes of information as an asset may provide an identifiable link between information management and improved business performance. Identifying attributes of information assets that are recognised and valued by senior managers in today’s information-intensive UK organisations is a key step in developing evidence for a link between information management and organisational performance.

The research study engaged with a range of stakeholders in the information as an asset domain, including: senior British information managers, senior executives and managers and internationally-active information professionals and academics. Open-ended guided interviews were conducted with stakeholders. Four case studies in information-intensive UK organisations formed the major data collection strategy.

Findings highlighted the importance of customer information assets. The most important attribute identified was quality. Information assets and their attributes were linked to competitive advantage with customer involvement and management attention being the key issues identified. A grounded theory of information assets, that takes competitive advantage as its core category, is proposed.

KEYWORDS

Information as an asset, Attributes of information as an asset, Measuring the effects of information assets, Intangible assets and Business performance.
ACKNOWLEDGEMENTS

This work was carried out at the Department of Information Science, Loughborough University. I would like to thank BLRIC (British Library Research and Innovation Centre) and the AHRB (Arts and Humanities Research Board) now a UK Research Council (AHRC) for funding the research projects which provided the impetus for this study. The following members of the AHRB Project Advisory Committee all contributed useful comments to the work: Ken Wild - Technical Director - Deloitte & Touche, Shân Kennedy - Director - Deloitte & Touche, Derek Martin - Chairman - Martin Hamblin gfk, Simon Matty - Research Programme Manager - Resource and Cedric Popa - Assistant Director - Deloitte & Touche.
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CHAPTER 1

1. INTRODUCTION: THE RESEARCH QUESTION

The decision to embark upon this research study was a combination of my interest in finding ways in which information management might be shown to improve organisational performance and the opportunity afforded to me to pursue this interest whilst working as a Research Associate on two funded research projects at Loughborough University. These two research projects were conducted over a four year period between January 1999 and December 2002. The first of these research projects (January 1999-December 1999) was entitled “The valuing of information assets in UK companies” (Wilson et al. 2000a, 2000b, Oppenheim et al. 2000a, 2000b, 2000c, 2001a, 2001b). The project was funded by the British Library Research and Innovation Centre (BLRIC). It highlighted issues concerning the recognition of valuable business information by senior managers in information-intensive UK organisations.

The BLRIC work led to a further three year research project (January 2000 - December 2002) entitled “The attributes of information as an asset, its measurement and role in enhancing organisational effectiveness”. This research project was funded by the Arts and Humanities Research Board (AHRB). Findings are available in a series of articles published in the Journal of Information Science (Oppenheim et al. 2003a, 2003b, 2004) along with other papers (Oppenheim et al. 2002a, 2002b, 2003c) published during the project. The AHRB project investigated a number of key issues concerning the identification, measurement and management of information as an asset and its role in enhancing organisational effectiveness. These two research projects provided both the context and the impetus to carry out this research study. Overlaps do occur between the research projects and this thesis and these are acknowledged. However, such a substantial research area, involving both the information management and organisational performance domains provides a wealth of research issues which cannot be exhausted easily. Indeed much work remains to be done as outlined in Recommendation for further research in Chapter 9.
1.1 Definitions and debate

The issues addressed in this study, in particular those relating to the definition of data, information and knowledge, are the subjects of some debate. There is a great deal of difficulty involved in defining a concept that is as wide and varied as information:

"The problem is that a word like "information" is very vague. It can mean different things to different people" (Meadows 2001, p.vii.).

However, two main perspectives do exist in attempting to define information. The first perspective, sometimes known as the ICT (Information and Communications Technology) or "common-sense" perspective (Yates-Mercer & Bawden 2002, p.20) argues that information exists as a phenomenon that has meaning outside of the human mind. Information can exist in social and historical artefacts. This approach relies on the Shannon-Weaver mathematical model for information processing (1949) in which information is seen as a signal, subject to noise and confusion, but potentially meaningful.

The second perspective, the "cognitive model" (Yates-Mercer & Bawden 2002, p.21) argues that a distinction exists between information in the Shannon-Weaver sense, and meaningful information (i.e. that which is produced in the mind of the recipient). Knowledge is also distinct from meaningful information; it is what we know, while meaningful information is what we are able to communicate about what we know (Wilson 2002, p.3). The problem with this approach is that it is very difficult to say at which point information becomes meaningful information and in which ways this is distinct from knowledge.
A possible solution is offered by Orna (1999) when she describes information as:

"...what human beings transform knowledge into when they want to communicate it to other people. It is knowledge made visible or audible, in written or printed words, or in speech" (Orna 1999, p.8).

Exhibit 1. Definition of information

![Diagram]

Exhibit 1 proposes a definition of information which places the process of transforming knowledge as central. It is the leveraging of data, information and knowledge to create added value that is critical in organisations. The concept of leveraging focuses attention on the role of users and the purpose to which data, information and knowledge can be employed, e.g. Information + Users + Purpose = Leverage. Orna's (1999) definition of data, information and knowledge will be discussed further in Chapter 2.

The cognitive and common-sense models demonstrate that data, information and knowledge are concepts that can be interpreted and defined in a variety of ways. The debate, however, presents a significant problem for senior managers concerned with identifying and managing their significant information. From the ICT perspective, senior managers might perceive that unprocessed information represents what is valuable information in an
organisation and so concentrate efforts on data collection. The opposing view is that such information represents a repository only and, as such, has no value until it is worked on by the human mind. Such issues influence investment decisions in information assets and have implications for their identification and management.

There are examples of large stores of mainly unprocessed information or data being recognised as having value in the marketplace. For example, Centrica, the gas and home services firm, agreed a £80m 'divorce' settlement to allow its Goldfish credit card arm to move into Internet banking (BBC 2001, p.1). Centrica agreed to pay credit specialist HFC to ensure the handover of customer details, and end a court battle which threatened to delay expansion plans. The dispute with HFC, which owns the Marbles credit card brand, centred on a databank it had built up of one million Goldfish customers. While Centrica claimed ownership of the information, deemed vital for taking Goldfish into e-banking, HFC, which had a year left to run on its contract with Centrica, declined to hand the details over. The settlement demonstrates clear recognition of the value of large stores of customer information built up over many years. The less tangible aspects of information management, which may underpin critical organisational activities, are more hidden and therefore much more difficult to recognise or indeed value.

Information and communication

The definition of information proposed by Orna (1999, p.8) is limited in that, whilst it touches upon the issue of communication, it does not adequately address the communication of information. As Meadows, (2001, p.72) points out "Communication - like information is a weasel word with many meanings". The psychology of human information processing has been a rich area of research work, having its beginnings in the work of George A. Miller in the mid-1950's.

Miller (1956) proposed that, in a communication system, there is a great deal of variability involved in input and output and this can be described in terms
of variance. In a good communication system there will be some systematic relation between what goes in and what comes out. The measure of transmitted information is simply therefore a measure of the input-output correlation.

Taking a human observer as a communication system, Miller’s experiment involved increasing the amount of input information and then measuring the amount of transmitted information. If the observer’s judgments were accurate then nearly all of the input information will be recoverable from his/her responses. If he/she makes errors, the transmitted information may be considerably less than the input. Miller found that there seems to be some limitation “built into us, either by learning or by design of our nervous systems, a limit that keeps our channel capacities in this general range (Miller 1956, p.6). Miller’s “channel capacity” represented for him the number of alternative stimuli (the magical seven) that could be processed by the human mind before confusion appeared.

Miller conducted a second experiment in immediate memory which also identified the “magical number seven” as a constant and concluded that absolute judgement is also limited by the amount of information human beings can process. As shown in Exhibit 2 (adapted from Miller, 1956), the regrouping and reorganising of bits of information (input) into chunks of information is key to increasing capacity, since capacity is fixed.
The limitations of human communication channels and immediate memory span suggest that disparate stores of information may be more difficult for humans to process and hence recognise as being valuable. The role of information assets in organisations may therefore be pivotal in enabling the recognition of valuable information by senior managers.

Organisations

A second definition used in this thesis, that of an organisation, should also be discussed at an early stage. March and Simon (1964, p.4) use a biological analogy to describe an organisation:

“Organisations are assemblages of interacting human beings and they are the largest assemblages in our society that have anything resembling a central coordinative system.”

The phrase “interacting human beings” is an important one. The decision to participate in organisational activities reflects the different motivations of individuals. An organisation is made up of many different individuals and they interact at many different levels. The basic survival of any organisation
is dependent on a range of internal and external influences working together in
the building and maintaining of an organisational coalition (Cyert & March

Barnard (1938, p.6) states that "the survival of an organisation depends upon
the maintenance of an equilibrium of complex character in a continuously
fluctuating environment of physical, biological and social materials, elements,
and forces." This "continuously fluctuating environment" described by
Barnard might also usefully include information. Information has a role in
underpinning a diverse range of organisational activities which meet the
individual and collective interests of a diverse group of stakeholders. This
gives information a unique role in enhancing the effectiveness of the
organisation and so, in effect, improving organisational performance. The
definition of an organisation adopted for this thesis is therefore an
information-centred one. This definition also recognises the diverse range of
stakeholders who bring a range of information needs and contributions to their
organisations and which need to be maintained within the organisational
coalition if the organisation is to survive. The addition of information to
Barnard's (1938) description provides the definition:

"the survival of an organisation depends upon the maintenance of an
equilibrium of complex character in a continuously fluctuating
environment of physical, biological and social materials, elements, and
forces, and information."

It is interesting to speculate that if Barnard had been writing today, would he
have included information within his description?
1.2 Information management and organisational performance

The broad areas of interest explored in this thesis are "information management" and "organisational performance". Both of these areas are substantial fields in their own right.

Best (1996) describes the "information management" domain as concerned with supporting business objectives:

"the effective production, storage, retrieval and dissemination of information in any format and in any medium to support business objectives" (Best 1996, p.3).

The term "business" is not used in a legal sense and so can include non-commercial organisations such as charities and public sector organisations.

Cyert and March (1992, pp.19-20) also propose a definition of organisational performance that goes beyond profit maximisation to the development of goals and objectives achieved by decision strategies. They argue that once:

"organisational objectives and decision strategies are determined, the organisation can be viewed as an information-processing and decision-rendering system. We need more reliable information on where and how organisations secure information, how that information is communicated through the organisation, how authoritative decisions are reached, and finally, how such decisions are implemented in organisations" (Cyert & March 1992, p.21).

Using information and knowledge to make decisions is a prime example of the application of information management to improve organisational performance.
Within these broad areas of information management and organisational performance, there are distinct and sometimes disparate themes which are relevant to the development of this thesis. These include the definition and integration of data, information and knowledge (Orna 1999; Yates-Mercer & Bawden 2002; Wilson 2002), the value of information (Badenoch et al. 1994), the identification of information as an asset and attributes of information assets (KPMG/IMPACT 1994; Reuters 1995; Burk & Horton 1988), the intangible asset domain (Canibano et al. 2000; Fincham & Roslender 2003; Lev 2004), the nature of learning organisations (Argyris & Schön 1996; Senge 1990; Crossan et al. 1999), organisational effectiveness (Georgopoulos & Tannenbaum 1957; Seashore & Yuchtman 1967; Katz & Kahn 1966; Drucker 1974; Cullen 1998). Finally, the impact of information management on organisational performance (Marchand 2000, Marchand et al. 2001a, 2001b; Orna 2004) is discussed.

The role of information assets in informing business strategy (Porter 1985; Horton 1993; Wilson 1994), the role of information assets in securing competitive advantage (Porter & Millar 1985; Marchand 2000; Broady-Preston & Williams 2004) and the role of information in informing management decision-making (Simon 1957, 1979; Mintzberg 1973; Kaye & Little 1996; March 1997) are also important themes.

These themes are discussed in detail in Chapter 2 and provide a context for the research issues addressed.

The information economy

The concept of information as an asset has its origins in a resource-based view of information that was central to the discussions surrounding the development of an “information economy”. Economists such as Machlup (1962) and Porat (1977) pioneered the idea of an “information economy”. Cooper (1983, p.12) identified Machlup as the first proponent of an “information economy”, a new sector of the economy made up of:
“a group of establishments – firms, institutions, organisations, and departments, or teams within them, but also in some instances, individuals and households that produce knowledge, information services or information goods, either for their own use or for use by others” (Machlup 1962, p.228).

There has been a shift from the nineteenth century “industrial society” to a “post-industrialist society” or “information economy” (Machlup 1962; Bell 1979; Porat 1977). A “knowledge economy” (Skyrme 1998) or “intangible economy” (Eustace 2000) is now apparent.

This is an economy in which:

“Knowledge is the overwhelmingly important productive resource in terms of its contribution to value added and its strategic significance” (Grant 1997, p. 451).

Peter Drucker (1969, p.321) predicted that, by the late 1970’s, the “knowledge sector would account for one half of total gross domestic product (GDP) in the USA”. One example of the realisation of Drucker’s prediction can be seen in the service sector, which now accounts for a rising share of output and employment (Leadbeater 2000, p.93). This is not only evident in developed nations like the UK and the USA, but also in rapidly developing economies such as Singapore (Leadbeater 2000, p.93). Information also promotes competitive advantage (Porter 1980, 1985; Hamel & Prahalad 1996) and sustains organisations over the long-term (De Geus 1997). Unfortunately, the financial benefits of investments in information are often only seen in the long-term (Abell 1994). They are typically difficult to justify within a conventional financial reporting framework and this has led to international efforts to secure reform, e.g. traditional indicators of organisational success such as return on investment and shareholder value are now being re-examined, however, progress is slow (Upton 2001). Concepts such as intellectual capital and knowledge management are resulting in a range of new
measures by which organisational performance can be judged (Stivers et al. 1998).

The impact of computers on society has also been critical to the development of the information economy. The transformation of knowledge into information, “the systematisation of what is known”, depends on the ability to record knowledge. The process of recording implies a process of selection. Information is inseparable from the ability to record it leading to a definition of information as a subset of knowledge which is recorded in some symbolic form (Feather 2000, p.111). However, senior managers are somewhat overwhelmed by the sheer amount of information which the new economic and computer-based society order has brought. This phenomenon is often termed as “information overload” (Reuters 1998).

Interest in the intangible or hidden assets that an organisation creates is also a feature of the information economy. Intellectual property such as brands and trademarks are often of greater value to an organisation than its products (Hope & Hope 1998). Less traditional intangible assets, such as those based in knowledge and intellectual capital, are increasingly the subject of debate in the accounting community (CIMA 2001). Identifying information assets and exploring their role in organisational performance are critical to the debate on intangible assets and this will be discussed in detail in Chapter 2.
1.3 Research issues

The aim of this research study is to develop an exploratory model concerning the role of information assets in enhancing organisational performance. Specifically, the study addresses the following research questions:

1. What information assets are held and used by a selection of information-intensive UK organisations? Are there similarities and differences between the case study organisations?
2. What are the significant attributes of these information assets?
3. What mechanisms are used by senior managers in these information-intensive UK organisations to identify, manage and protect information assets?
4. What is the role of attributes of information assets in enhancing organisational effectiveness?
5. Can the effects of attributes of information assets be measured?
6. What are the implications for the theory and practice of information asset management?

The research issues addressed, research methods employed, subjects, analysis approaches and major findings by chapter are shown in Exhibit 3.
### Exhibit 3. Overview of research

<table>
<thead>
<tr>
<th>Research questions</th>
<th>Research methods used</th>
<th>Subjects</th>
<th>Approaches to analysis of data</th>
<th>Major findings</th>
<th>Chapter number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What information assets are held and used by a selection of information-intensive UK organisations? Are there similarities and differences between the case study organisations?</td>
<td>Focus group. Repertory grid exercise. Repertory grid interviews (piloting of case study interview questions). Case studies: Case study interviews. Case study interviews. Information asset-scoring grid.</td>
<td>27 Information managers. Five senior executives. 45 Senior managers. 45 Senior managers. 44 Senior managers.</td>
<td>Identification exercise. Repertory grid. ATLAS/Ti. ATLAS/Ti individual case study ratings. Excel.</td>
<td>Traditional assets identified in literature updated by group. Customer and Product information assets identified as important. Customer information, Competitive advantage, Customer involvement and Management attention identified as important. Management attention, Information assets, Customer involvement and Competitive advantage identified as important by Case studies 1, 2, 3 and 4. People management identified as important by Case study 3. Customer information identified as important (Case studies 1, 2, 4) and Management information (Case study 3).</td>
<td>5 5 6 6a 6</td>
</tr>
</tbody>
</table>
### Exhibit 3 Overview of research cont.

<table>
<thead>
<tr>
<th>Research questions</th>
<th>Research methods used</th>
<th>Subjects</th>
<th>Approaches to analysis of data</th>
<th>Major findings</th>
<th>Chapter number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. What are the significant attributes of these information assets?</td>
<td>Focus group.</td>
<td>27 Information managers.</td>
<td>Scoring exercise/Excel.</td>
<td>Attributes from literature out of date.</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Repertory grid exercise.</td>
<td>Five senior executives.</td>
<td>Repertory grid.</td>
<td>Attributes identified include managing internal and external operating environments.</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Case studies: Case study interviews.</td>
<td>45 Senior managers.</td>
<td>ATLAS/Ti.</td>
<td>Quality identified as important attribute.</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Information asset-scoring grid.</td>
<td>44 Senior managers.</td>
<td>Excel scoring sheets.</td>
<td>Quality and Utility identified as most important.</td>
<td>6</td>
</tr>
<tr>
<td>3. What mechanisms are used by senior managers in these information-intensive UK organisations to identify, manage and protect information assets?</td>
<td>Repertory grid.</td>
<td>Five senior executives.</td>
<td>Compare and contrast.</td>
<td>Intranets, extranets, database management systems, Executive management team.</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Case study interviews.</td>
<td>45 Senior managers.</td>
<td>ATLAS/Ti.</td>
<td>Identification mechanisms include – Intranets, customer reviews and management meetings. IT and security policies predominate management and protection.</td>
<td>6</td>
</tr>
<tr>
<td>Research questions</td>
<td>Research methods used</td>
<td>Subjects</td>
<td>Approaches to analysis of data</td>
<td>Major findings</td>
<td>Chapter number</td>
</tr>
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</tr>
<tr>
<td>4. What is the role of attributes of information assets in enhancing organisational effectiveness?</td>
<td>Literature Review.</td>
<td>None.</td>
<td>Compare and contrast.</td>
<td>Tentative link identified between information assets and organisational effectiveness. Competitive advantage given by information assets important.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Case study interviews.</td>
<td>45 Senior managers.</td>
<td>ATLAS/Ti.</td>
<td>Role for information assets in enhancing organisational effectiveness but difficulties in separating out impact of information from other variables.</td>
<td>6/6a</td>
</tr>
<tr>
<td></td>
<td>Interviews with internationally-active information professionals.</td>
<td>Six internationally-active information professionals.</td>
<td>Guided interviews.</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>5. Can the effects of attributes of information assets be measured?</td>
<td>Case study interviews.</td>
<td>45 Senior managers.</td>
<td>ATLAS/Ti.</td>
<td>34 senior managers (out of 45) reported their organisations did not measure effects of attributes of information assets. Little progress made in measurement – major deterrent factor is situational nature of information use.</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Interviews with internationally-active information professionals.</td>
<td>Six internationally-active information professionals.</td>
<td>Compare and contrast.</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>6. What are the implications for the theory and practice of information asset management?</td>
<td>Literature review.</td>
<td>None.</td>
<td>Compare and contrast.</td>
<td>Need to develop evidence for link between information assets and organisational performance. Progress dependent on recognising information assets in use in organisations.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Interviews with internationally-active information professionals.</td>
<td>Six internationally-active information professionals.</td>
<td>Compare and contrast.</td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>
1.4 Outline of the thesis

This chapter has introduced the basic ideas on which this research study is based. It has identified the research questions to be addressed. The importance of the research area was discussed and some working definitions were proposed.

Chapter 2 will locate the research issues identified within the information and business literature.

Chapter 3 describes the interpretive foundations of the research and outlines the epistemological, ontological and methodological questions to be addressed. The merits of qualitative and quantitative research approaches are discussed. The limitations and assumptions of the research are outlined.

Chapter 4 describes the major research methods employed in data gathering.

Chapter 5 presents the findings of the preliminary research including repertory grid technique.

Chapter 6 presents the findings of the case studies carried out in four information-intensive UK companies.

Chapter 6a provides a review of the four case studies conducted and aims to discover any similarities or differences between the four case studies.

Chapter 7 proposes a grounded theory for information assets and presents the grounded theory model for information assets.

Chapter 8 discusses the research results and offers insights into the role of information assets in enhancing organisational performance.
Chapter 9 presents conclusions arising from the research for the theory and practice of information asset management. Recommendations for further research are made.

1.5. Summary

This chapter has set out the research issues in the context of the broad areas of information management and organisational performance. It has provided some working definitions adopted in the thesis. It has also described my motivation for undertaking this research study and acknowledged the role of BLRIC and the AHRB in providing the impetus and opportunity to explore this rich research area. The role of all those individuals (Project Directors, Advisory Committee Members and Expert Reviewers) involved in managing and advising on the research study is also warmly acknowledged. The major findings and research methods employed have also been outlined together with a presentation of the structure of the thesis.

The importance of the research area has also been described. The role of information assets in enhancing organisational performance is an area of research that has been the subject of some interesting work, but it is only now that the importance of information in the intangible economy is being recognised. This makes the study of information as an asset all the more essential.
CHAPTER 2

2. LITERATURE REVIEW

In this chapter, a critical review of the literature relevant to the research issues are presented. Section 2.1 explores the definitions adopted in this thesis. The identification of information as an asset is located within the information resource and intangible asset debate. The role of information assets in enhancing organisational performance is presented. The chapter concludes with a summary of the significant findings from the literature.

The following exhibit (Exhibit 4) illustrates how the wider subject areas explored in the literature review are related.
Exhibit 4. Wider subject areas of the literature review and their relationship

Information management and Knowledge management

Intangible assets

Attributes of intangible assets

Attributes of information as an asset

Valuation of intangible assets

Information as an asset

Value of information

Organisational performance

Decision-making

Business strategy

Organisational effectiveness

Organisational learning
2.1 Data, information and knowledge – definitions

This section explores the definitions of data (D), information (I) and knowledge (K) adopted in this thesis. Two approaches to the definition of data, information and knowledge are identifiable. These are: the "common sense" approach and the "cognitive approach" (Yates-Mercer & Bawden 2002).

2.1.1 Common sense approach

The importance of data, both in its own right and as a building block for information, is central to the "common sense" approach. Meadows (2001, p.108) examines the nature of data by equating it with energy:

".. the basic unit of data is the bit. To create a bit requires a certain amount of energy. We can therefore equate the energy in the universe to an equivalent number of bits. In essence, this means that we can think of the universe as being made up of data, just as correctly as we can think about it as being made up of mass or energy."

Data provides the building blocks for information:

"Data form the basis for constructing information" (Meadows 2001, p. 110).

Information is described as a "message" by Davenport and Prusak (1998). They propose the following well-known definition of information:

"Information is a message, usually in the form of a document or an audible or visible communication" (Davenport & Prusak 1998, p.3).
Using Davenport and Prusak’s (1998) definition of information, value is added when data is:

- Contextualised (C1) - we know for what purpose the data was gathered.
- Categorised (C2) - we know the units of analysis or key components of the data.
- Calculated (C3) - the data may have been analysed mathematically or statistically.
- Corrected (C4) - errors have been removed from the data.
- Condensed (C5) - the data may have been summarised in a more concise form (Davenport & Prusak 1998, p. 6).

Or,

$$D + C1 + C2 + C3 + C4 + C5 = I$$

Data thus becomes information when it is transformed using one or more of these five processes, and can in its turn be transformed into knowledge:

$$D \rightarrow I \rightarrow K$$
The transformation of information into knowledge happens through:

- **Comparison (C1)** - how does information about this situation compare to others we have known?
- **Consequences (C2)** - what implications does the information have for decisions and actions?
- **Connections (C3)** - how does this bit of knowledge relate to others?
- **Conversation (C4)** - what do other people think about this information? (Davenport & Prusak 1998, p.6).

Or,

\[ I + C1 + C2 + C3 + C4 = K \]

This linear progression from data to information to knowledge with a corresponding increase in value has also been represented by a pyramid model shown in Exhibit 5. The pyramid model, adapted from Wilson (1996) and Checkland and Holwell (1998), shows a linear progression from capta (data which is relevant) which forms the base of the pyramid to information with knowledge at the pinnacle:

Exhibit 5. Pyramid model

The pyramid model is described by Yates-Mercer and Bawden (2002, p.20) as the “common sense approach”, where the transformation of data into knowledge is primarily a pragmatic distillation process. As Yates-Mercer and Bawden (2002, p.21) point out, it is unclear exactly when the transformation is
made between the varying elements. In addition, data, information and knowledge are seen as being readily identifiable and communicable in this pyramid model. If they are not so readily identifiable, especially by those senior managers responsible for making investment decisions in information, then this means that the less tangible or hidden elements, which might well add the greatest value, may be ignored.

2.1.2 Cognitive approach
A second approach to the definition of data, information and knowledge can be described as the “cognitive model”, see Exhibit 6 adapted from Yates-Mercer and Bawden (2002, p.21).

Exhibit 6. Cognitive model

This model regards knowledge as something intrinsic in the human mind which cannot be directly communicated. Information thus forms the bridge between subjective knowledge and objective knowledge which can be communicated and transferred. Both the “common sense” and “cognitive models” depend on the ability of knowledge held by human beings to be communicated by transforming it into information. This ability is questioned and indeed rejected by Wilson (2002) who describes such approaches as being based on a misinterpretation by Nonaka and Takeuchi (1995) of Polyani’s (1958) definition of tacit knowledge:

“Tacit knowing achieves comprehension by indwelling, and ... all knowledge consists of or is rooted in such acts of comprehension” (Polyani 1958, p.17).
Nonaka and Takeuchi (1995) identified two types of knowledge in their study of innovation in Japanese companies:

- Explicit knowledge.
- Tacit knowledge.

Explicit knowledge is knowledge that is already recorded, or is capable of being recorded in the form of documents, reports, articles, manuals, procedures, videos, software and so on. Tacit knowledge is personal knowledge and intuition, embedded in individual experience, and is usually shared and exchanged through direct face to face contact (Willard 1997, pp. 31-32).

Tacit knowledge can be communicated quite quickly, whereas explicit knowledge has to be found, read, digested and understood. Wilson (2002, pp. 26-28) argues that Polyani’s definition of tacit knowledge referred to the process of human comprehension rather than communicable knowledge as understood by Nonaka and Takeuchi (1995), and that such personal knowledge was non-transferable.

Wilson (2002) takes comprehension as the key word in Polyani’s definition and proposes a much more limited view of knowledge as:

“.....what we know: knowledge involves the mental processes of comprehension, understanding and learning that go on in the mind and only in the mind, however much they involve interaction with the world outside the mind, and interaction with others” (Wilson 2002, p. 3).
Such tacit knowledge cannot be transferred or transformed into information that represents in any form the knowledge base of a particular person. Rather, the information produced must be assimilated and incorporated within another person’s knowledge structure in order to gain meaning. Because acquiring knowledge involves the act of comprehension (Wilson 2002), which is an inexpressible process, such tacit knowledge cannot be communicated or transferred. Explicit knowledge, on the other hand, is equated by Wilson (2002) with information.

This assumes that such information is understood or made sense of, for, as asserted in Dervin’s sense-making metaphor, it is human behaviour in terms of individuals responding to situations and applying individual strategies and judgements which defines information as “that sense created at a specific moment in time-space by one or more humans” (Dervin 1992, p.62). The perception of and judgement criteria used by individuals is central. For example, “one human may wish to judge a moment of information use by a standard he or she calls accuracy, while another may wish to judge by expediency or familiarity or comfort” (Dervin 1992, p.63).

The centrality of understanding and comprehension to information and knowledge are proposed in Exhibit 7.

Exhibit 7. Centrality of understanding and comprehension

Information → Knowledge
Sense-making (Understanding and comprehension).

Such definitions and the debates they create have important implications for organisations and their approaches to managing information. Yates-Mercer and Bawden (2002, p.21) argue that organisations which take the “common sense” approach will focus on databases and other tools for managing their data, information and knowledge and will seek to capture knowledge within structured systems. Organisations which take the “cognitive approach”
believe that knowledge resides in the minds of employees and will use cultural means to encourage knowledge sharing and communication, for example, encouraging face to face communication. When assessing these approaches using Wilson's (2002) definition of knowledge, it is clear that the "cognitive approach" will be more successful than the "common sense" approach, as it accepts that tacit knowledge cannot be captured, concentrating resources on that which is achievable.

2.2 Information – transformation

The cognitive approach, however, largely ignores the transformation process undertaken by human beings which is highlighted by Orna's (1999) definition of information which positions information rather than knowledge as the critical element. Concentration on the ways in which human beings transform knowledge they wish to communicate to others informs the definition of information proposed by Orna (1999). Orna proposes a view of information as that knowledge that is to be communicated:

"Information is what human beings transform knowledge into when they want to communicate it to other people" (Orna 1999, p.8).

Or,

\[ K \rightarrow I \]

The transformation of information to knowledge and back again is a critical process as it implies the adding of value:

\[ K_0 \rightarrow K_1 \]

\[ + I \]

Thus information adds value as \( K_1 \) is greater than \( K_0 \). Orna's definition is a useful one as it focuses on the transformation process through which value is added. Orna's definition seems a realistic approach which highlights the possibilities of human transformation of knowledge into information and the value which such transformation adds. It does not ignore the existence of
subjective knowledge but concentrates on that knowledge which humans want to communicate. This is the definition of information adopted for this thesis, shown in Exhibit 1, Chapter 1.

### 2.3 Information management and knowledge management

Tom Peters (Peters 1992, p.123) argues that all organisations are “knowledge-based societies”. Peters saw a growing focus on knowledge as the key to the future of the organisation:

> “The ability to rope in knowledge, learn from what other parts of the organisation are doing, and reinvent the organisation in a flash, becomes arguably, the principal source of future value added” (Peters 1992, p.123).

Hansen et al. (1999, p.107) identify two approaches to managing knowledge:

- Codification strategy.
- Personalisation strategy.

Hansen et al. (1999, p.107) describe the codification strategy as being centred on the computer. Knowledge is codified and stored in databases, where it can be accessed and used easily. Conversely, organisations which adopt the personalisation strategy see knowledge as closely tied to the person who developed it and shared through direct person-to-person contacts. The choice between codification and personalisation is the central one facing virtually all companies in the area of knowledge management according to Hansen et al. (1999, p.107). The “cognitive” and “common-sense” approaches are mirrored by the Personalisation and Codification strategies.
Knowledge management in organisations is defined by Skyrme (1998, p.534) as:

"the explicit and systematic management of vital knowledge and its associated processes of creating, gathering, organising, diffusion, use and exploitation."

Skyrme (1998) takes a life-cycle approach that is similar to the definition of information management proposed by Best (1996, p.4) as:

"the effective production, storage, retrieval and dissemination of information in any format and on any medium to support business objectives."

The concepts of knowledge management and intellectual capital are also closely connected. Intellectual capital is defined by Edvinsson and Malone (1997, p.368) as:

"the possession of knowledge, applied experience, organisational technology, customer relationships, and professional skills that provides a competitive edge in the market."

These definitions of knowledge management, information management and intellectual capital appeared over only a 10 year period. A basic comparison of the concepts is shown in Exhibit 8. It is suggested that it is useful to view them as supporting rather than disparate concepts.
Exhibit 8. Comparison of concepts (KM, IC, IM)

<table>
<thead>
<tr>
<th>Knowledge management</th>
<th>Proposed Impact</th>
<th>Intellectual capital</th>
<th>Proposed impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information management</td>
<td>Proposed impact</td>
<td>Support objectives.</td>
<td></td>
</tr>
<tr>
<td>Life-cycle approach (Best 1996).</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Both knowledge management and information management take a systematic life-cycle approach where a process of creation, use, distribution and ultimately disposal or reuse are central. Knowledge management goes further than traditional information management in linking such processes to organisational learning and the creation of future value added. Information management aims to support organisational objectives, whatever they may be. Intellectual capital, on the other hand, has a dual role in enhancing structural agility through technology and customer relationship management and providing a focus on internal skills and competencies. The proposed outcome for organisations which adopt the intellectual capital approach is improved competitive edge.

The integration of concepts such as knowledge management, information management and intellectual capital and the benefits which this might have for organisations recognises that there is much in common among them. Orna (2004, p.142) identifies the following areas as shared territory of both the information management and knowledge management domain:
• “The knowledge and information implications of what the organisation thinks it's in business for.

• Policy and strategy for using knowledge and information to support business processes.

• The value added by using knowledge and information.

• Monitoring change in external and internal environments for potential effects on what knowledge and formation the organisation needs to create its offerings and achieve its objectives.

• Monitoring and evaluating the effects of using information and knowledge. Bringing the results of monitoring into central strategic decision-making.

• Matching the way knowledge and information are managed to the direction in which the organisation seeks to go, to its existing culture(s), and to desired cultural changes.”

This integration might also usefully include intellectual capital concepts. Such integration suggests that it is also possible and indeed beneficial to integrate data, information and knowledge.

2.4 Integration of data, information and knowledge

Data, information and knowledge necessarily form the basis of information and knowledge assets. The definition of data, information and knowledge and of the broader areas of information assets, knowledge management and intellectual capital influences what these comprise.

Data and Information assets

Information assets can be extended to include data and data assets since, according to Orna (1999, p.8), such objective facts become useful only when they are acted on by human beings. Information assets can also encompass knowledge and knowledge assets.
Knowledge assets

Boisot (1998, p. 13) defines knowledge assets as "those accumulations that yield a stream of useful services over time while economising on the consumption of physical resources". Such knowledge assets are based on explicit knowledge and could be more usefully included as information assets (see Exhibit 9 adapted from KPMG/IMPACT (1994), Davenport & Prusak (1998) and Boisot (1998)).

Exhibit 9. Data, information and knowledge

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data</strong></td>
<td><strong>Information</strong></td>
<td><strong>Knowledge</strong></td>
</tr>
<tr>
<td>Factual.</td>
<td>Communicated.</td>
<td>Understanding.</td>
</tr>
<tr>
<td></td>
<td>Transferred.</td>
<td>Learning.</td>
</tr>
<tr>
<td><strong>Data assets</strong></td>
<td><strong>Information assets</strong></td>
<td><strong>Knowledge assets</strong></td>
</tr>
<tr>
<td>Databases.</td>
<td>Customer information.</td>
<td>Useful services over time.</td>
</tr>
<tr>
<td>Systems.</td>
<td>Competitor information.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Product information, etc.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Accumulated experience</td>
<td></td>
</tr>
</tbody>
</table>
Exhibit 10, based on KPMG/IMPACT (1994), Davenport and Prusak (1998) and Boisot (1998) shows information assets as being capable of integrating all three original categories of data, information and knowledge.

Exhibit 10. Information assets

<table>
<thead>
<tr>
<th>Information</th>
<th>Discrete</th>
<th>Comprehension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structured</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communicated</td>
<td>Factual</td>
<td>Learning</td>
</tr>
<tr>
<td>Understanding</td>
<td></td>
<td></td>
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<tr>
<td>Transferred</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Information assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer information.</td>
</tr>
<tr>
<td>Competitor information.</td>
</tr>
<tr>
<td>Product information, etc.</td>
</tr>
<tr>
<td>Accumulated experience.</td>
</tr>
<tr>
<td>Databases.</td>
</tr>
<tr>
<td>Systems.</td>
</tr>
<tr>
<td>Useful services over time.</td>
</tr>
</tbody>
</table>

In Exhibit 10, the attributes of data and knowledge are encompassed by the overarching concept of information which leads to the definition of a much wider range of information assets, including for example, accumulated experience. If information can form an umbrella category which includes data, information and knowledge that is structured, communicable and transferable among human beings, then the definition of information as an asset becomes the central concern. This will be discussed in the following section.
2.5 Information as an asset

The definition of information as an asset has its origins in a resource-based view of information. Black and Marchand (1982, p.205) trace the rise of a resource-based view of information from the mid-1970's, when the US Government realised that it was in danger of drowning under paperwork and doing so at an unsustainable cost. It set up a Commission on Federal Paperwork, which stated that:

"...as a resource, data and information can and must be managed just as we manage human, physical and financial resources. Data and information must be subject to the same budgetary, managerial and audit disciplines as any other resource" (Black & Marchand 1982, p. 207).

Burk and Horton (1988) epitomised the resource-based view of information in their work on identifying key corporate information resources. These were the information resources vital for organisational activities. Burk and Horton’s (1988) approach concentrated on harnessing information resources already present in organisations and identifying uses of these resources. Values were assigned to information resources by Burk and Horton (1988) based on strategic weightings (where the organisation’s overall business strategy provides criteria for weighting individual information resources in terms of their usefulness for particular strategies). Only when weightings had been assigned were costs considered. An information audit then periodically ensured that “best value” was attained for costs expended. The approach concentrated on the productivity of information resources in relation to their costs (Black & Marchand 1982, p.206). The link between business strategy and information resources identified by Burk & Horton (1988) was a critical one.

The resource-based approach to information was adapted in the 1990’s by two highly-regarded and well-publicised reports, the Hawley Report (KPMG/IMPACT 1994) and Reuter’s Information as an asset: the invisible
goldmine (Reuters 1995), both of which attempted to identify information as an “asset”. The Hawley Report (KPMG/IMPACT 1994) was produced by KPMG with the backing of the Confederation of British Industry (CBI). It argued that information is a vital resource and proposed that someone at board level should be responsible for its management. The key finding of this report stated:

“……all significant information in an organisation, regardless of its purpose, should be properly identified, even if not in an accounting sense, for consideration as an asset of the business. The board of directors should address its responsibilities for information assets in the same way as for other assets, e.g. property, plant” (KPMG/IMPACT 1994, p.23).

The Hawley Report (KPMG/IMPACT 1994) recommended that information assets should be identified and classified by value and importance, and that skilled resources were needed to manage information assets and harness them. This was to ensure information assets were providing the maximum business benefit. Dr Robert Hawley (1995, p. 237), the chairman of the committee that produced the Hawley Report, pointed out that many intangibles (like brands, people and intellectual property) had received attention in the business literature. This meant that boards of directors were at least aware of most of them – and aware that attention should be paid to them. In contrast, very few organisations recognised the value of information. The Hawley Report (KPMG/IMPACT 1994) positioned this recognition of the importance of information as being pivotal. If boards of directors were not paying attention to information, then there was, at best:

“……a lack of consistency in strategic understanding, planning, budgeting, management and control, and at worst, the very existence of the organisation can be under threat” (Hawley 1995, p.237).

The Hawley Committee (KPMG/IMPACT 1994) argued that the first step in benefiting from the information held and used by organisations was a formal process of identification. They found that a number of information types or
assets were consistently identified across organisations. Information assets were defined as:

"...information that is or should be documented and which has value or potential value" (KPMG/IMPACT 1994, p.23).

The idea that information has potential value is a significant one and will be discussed in section 2.7.

The eight categories of information assets identified by the Hawley Committee were:

"Market and customer information e.g., regional utilities have large amounts of data on every household in their regions; trade names and trade marks.

Product information e.g., the depth of knowledge in particular technologies which support particular products such as fluid and thermal dynamics in the aerospace industry. This includes both registered and non-registered intellectual property rights (IPR).

Specialist knowledge and information for operating in a particular area, which is often in people's heads (e.g., retailing know-how amongst managers of grocery supermarkets who find even associated areas of retailing difficult to move into. Since the publication of the Hawley Report, retailers (e.g. Tesco) in the UK have become very successful in expanding their markets into associated consumer durables. This type of knowledge is also now addressed in part by knowledge management techniques but, at the time of the Hawley Report, knowledge management was not a well-established activity).

Business process information that underpins the workings of the business within the broader context e.g., economic, political, share price and other information that financial markets use.
Management information, particularly that on which major policy, competitive decisions or strategic plans will be based, e.g., economic statistics, or cost base information.

Human resource information e.g., skills databases, particularly in project-based organisations such as consultants in a technology company who need to be brought together to support a client project. Again, these days knowledge management attempts to address this area.

Supplier information e.g., trading agreements or networks of contacts for services or product development.

Accountability information e.g., legally-required information including shareholder information, health and safety information or environmental pollution evidence” (KPMG/IMPACT 1994, pp.9-10).

(These eight information assets were revised and updated by an information managers’ discussion forum, see Chapter 5, and the revised assets were used in the case study work, see Chapter 6).

The identification of information as a vital asset for business was further developed by the publication of Information as an asset: the invisible goldmine, (Reuters 1995) which reported the results of 500 telephone interviews with senior managers in UK companies. The main conclusions of this report were that one in four UK companies said that information was its most important asset; half thought it was more important than trade names and registered trade marks; and one in ten valued its information more than its staff. However, more than 40% of respondents said their companies had not woken up to the value of their information.

The results showed that companies wanted to capitalise their expenditure on information, yet some 25% of the respondents said they could not capitalise information assets because they found it too hard to identify what the value of the assets were (Reuters 1995). These reports seemed to indicate that
organisations would benefit financially from defining information as an asset and that new ways of identifying, measuring and managing information would eventually emerge.

Despite the wide publicity and high regard with which both the Hawley Committee and Reuters reports were received they had in fact little impact on the ways in which organisations addressed the management of their information resources. In a study of 12 high-performing organisations by Owens and Wilson (1997) it was found that traditional information roles were being taken over by Information Technology (IT) personnel. This put an emphasis on the effective storage and retrieval of information rather than the quality of the information itself (Owens & Wilson 1997, p.26). The traditional information specialist was playing a diminishing role in the organisations surveyed. The IRM approach, though not widely applied, was significant, however, because it not only identified the cost of information but also sought to identify its value. It remained focused on cost and productivity and this led to criticism of the approach. In particular, Eaton and Bawden (1991, p.156) summarised the views of many when they pointed out that “if information is a resource, it is different in kind from most others”. The value of information debate is central to this criticism and is discussed in the following section.

2.5.1 Value of information

The concepts of value and of information as an economic resource are discussed in this section. Attempts to calculate the value of information assets are outlined and reasons suggested for their lack of success.

Value

The definition of value itself is problematic and provides no basis for a value of information. Boisot (1998, p.72) states that there is no settled definition of value and traces the development of the concept of value in economic theory from before the 1870’s when physiocrats (who believed land was the main generator of value) opposed mercantilists (who believed mineral wealth such as gold and silver were the ultimate source of value).
Others argued that value resided in the transformation that humans wrought upon nature rather than nature itself. Some viewed human or animal labour as the source of all value. This view was shared by classical economists such as Adam Smith and David Ricardo. Physiocrats, mercantilists and classical economists all took value to be energy based. In no case did information play any significant role. In the second half of the nineteenth century, value became relational and contingent, being established through the interplay of the supply and demand conditions for goods. Information was never treated as the central focus in a transaction and hence an object of exchange in its own right (Boisot 1998, p.72). As such, attempts to place a financial value on information were not rooted in sound foundations.

2.5.2 Attempts at information valuation

Badenoch et al. (1994, pp.23-62) groups attempts at finding information value into four categories:

1. Econometric approaches (e.g. economic value added).
2. Organisational management and resource management perspectives (e.g. IRM).
3. Costing, pricing and evaluation of library and information services (e.g. Performance measurement).
4. The social value of information (e.g. contribution to social good).

The value of information depends on its context and use (Eaton & Bawden 1991, p.163) and its value to users is impossible to determine in advance. Eaton & Bawden (1991) argued that identifying information as a resource had become shorthand for “information is important.” In other words, concentration on quantifying information detracted from the dynamic role information played in organisations. Attempts to measure value limited the dynamic nature of information and ultimately destroyed innovation in organisations.
None of the methods gained widespread acceptance and Badenoch et al. (1994, p. 62) conclude that this is because “we cannot consider the value of information out of context of the activity or decision it supports”.

Valuation methods

The following examples of attempts to place a value on information demonstrate some of the difficulties which are often encountered when trying to place an objective value on information.

Griffiths and King (1991, p. 109) focused on estimates of the cost of information to users of in-house information services (e.g. desk research, online searching) if these were not available. Their approach saw the main factor in valuing information not as the value of the resource itself but the value of the time and effort spent by users in obtaining information elsewhere. This seems an objective measure of the cost of information. However, if we consider that any one user’s time may be worth more or less than that of other users and that many users in practice would not be interested in obtaining information from elsewhere, then the measure appears less than objective. It also assumes that the user will apply the information to create value for the organisation. The information found may be of no use at all, i.e. it may have a cost but no value.

Glazer (1993) attempted to value transaction-based information and identified two levels of value: the value of information as it is currently being used; and potential ways in which information could be used:

\[ V(a) \text{ current actual value} \]
\[ V(p) \text{ potential value of information} \]

Glazer (1993) undertook a valuation exercise in an electronics company using the above categories of value. This resulted in a figure of $25 million for the value of information which could be generated from potential uses of transaction-based information. Glazer’s method assumed that all the information held by the organisation was valuable. This was by no means
certain since, as Orna (1996, p.20) points out, “information has no inherent value in itself”.

2.5.3 An objective value for information?
Arriving at a value of information is not an objective exercise. Different stakeholders (e.g., customers, employees, managers, suppliers, society, owners and investors) will employ different methods depending on their various perspectives. Their evaluations will be subjective. Attempts to value information and place it on the balance sheet of organisations does have benefits in that it positions information within an area of financial management with which all senior managers are concerned. However, an objective value of information (and indeed of traditional and non-traditional intangible assets) is not possible. Information value, by its very nature is subjective, and is dependent on the interpretation of the individual or team members who employ information in particular situations for particular purposes. In any case, objective measures are often far less reliable than they at first appear. Accounting has been highlighted as an area where organisations such as Enron and Worldcom can present seemingly objective and audited financial statements, which have in fact little to do with their real underlying financial position.
2.6 Intangible assets

Interest in demonstrating the value of knowledge, information and organisational capabilities (defined as the collective skills, abilities and expertise of an organisation) (Ulrich & Smallwood 2004, p.119) has developed within the context of a growing understanding of the role of intangible assets in organisational performance.

Intangible assets are defined as:

"identifiable (separable) non-monetary sources of probable future economic benefits to an entity that lack physical substance, have been acquired or developed internally from identifiable costs, have a finite life, have market value apart from the entity and are owned or controlled by the firm as a result of past transactions or events" (Canibano et al. 2000, p.107).

Canibano et al. (2000, p.107) point out, however, that a wide range of elements are currently regarded as intangible determinants of the value of companies but do not fit this definition of intangibles. They identify a fundamental question: "if they are sources of future economic profits, why are they not reported by all corporations?" The explanation offered by Canibano et al. (2000, p.107) is two pronged, firstly the lack of skills in the accounting profession to develop a "generally accepted set of guidelines for the identification and measurement of all intangibles" and secondly, "the emphasis placed by most accounting standard setting bodies on the reliability of financial statements rather than their relevance". Kaplan and Norton (2004, p.54) argue that "measuring the value of intangible assets is really about estimating how closely aligned those assets are to the company's strategy".

Guidelines for intangibles

This is a vibrant research area which is constantly progressing. The first issue, identified by Canibano et al., the lack of a generally accepted set of guidelines, has seen a great deal of progress.
Research funded by the European Commission and conducted at City University (Eustace 2000, p.7) recommends the creation of new intellectual property rights (IPR) frameworks which reflect the growing European intangible economy. The Institute of Chartered Accountants in England and Wales (ICAEW) has published a short discussion paper on valuing intangibles (Vance 2001). The Danish Patent Office has also been progressive in developing an evaluation model for patents to help identify untapped business potential (Ernst & Young & Ementor 2000). Research projects funded by the European Union (EU) demonstrate the significant advances that have been made in developing a comprehensive approach to intangibles. Three projects, MAGIC, MERITUM and PRISM, demonstrate the level of activity in this area.

MAGIC (1998-2001)
The acronym stands loosely for Measuring and AccountinG Intellectual Capital. The overall objective of the MAGIC project was the development of a low-cost and pragmatic IT-solution for the measuring and accounting of Intellectual Capital (IC) in engineering and manufacturing environments. The partners of the MAGIC project were: QPR Software (Finland), Institute for Human Factors and Technology Management IAT (Germany), Profactor (Austria), CDN (Spain), ISD (Portugal), and Invenio (Germany). In addition, some 40 European companies including Siemens AG and Volkswagen from Germany and Sonera from Finland have participated in the project's Business Interest Group to test and give feedback on the methodology and software technology. The project sought to produce a practical method for the measurement of IC and software to support the implementation of metrics programmes.

The project aims were to develop methods and tools which enabled the quantitative as well as the qualitative evaluation of IC. The main deliverables of the project were essentially:
Benchmarking study of "Best Practice" in measuring Intellectual Capital (IC).

KM methodology handbook describing the system of methods and tools for the measurement and accounting of IC.

IT-tool for the support of the measurement and accounting of IC based on standard software solutions.

CD containing elaborated road map "How to evaluate and better manage Intellectual Capital (IC)" (MAGIC 2001).

The methodology for measuring Intellectual Capital as defined in the MAGIC project can be divided into four categories: Human Capital, Organisational Capital, Market Capital, and Innovation Capital.

**Human Capital** comprises all the skills, expertise and competencies of the company to react on market demands and customer needs including leadership and management issues and capabilities.

**Organisational Capital** comprises the capabilities of a company, its infrastructure and organisational processes to provide products and services to the market.

**Market Capital** represents the capabilities of a company to interact with the external interface like the customer, partners, and suppliers and other stakeholders.

**Innovation Capital** refers to a company's ability to innovate, improve and develop unutilised potential as well as generate long-term wealth (QPR 2002).

In a survey conducted for the project 83% of industrial respondents believed that measuring intellectual capital is critical to achieving business success (QPR 2002). The project appears to have had limited impact but has provided a basis for ongoing work.
MERITUM (1998-2001)
The acronym stands loosely for Measuring Intangibles to Understand and improve innovation Management. The MERITUM project involved six European countries (Denmark, Finland, France, Norway, Spain and Sweden) in a comparative research project. The broad aims of the project were:

- To develop insights into the process of transforming intangibles as sources of increased wealth, growth and employment, including research into managing and accounting for intangibles.
- To develop guidelines for the measurement and disclosure of intangibles.

Four main activities were undertaken:

- Developing a set of classification schemes for intangibles.
- Investigating the management control implications of intangibles.
- Investigating implications for capital markets such as respective levels of return on human and other intangible assets.
- Developing guidelines for measurement and disclosure of intangibles (Hill & Youngman 2003, p.2).

The MERITUM project report, published in June 2001, proposes a set of dynamic indicators for intangibles which include:

Useful
Relevant
Significant
Understandable
Reliable (objective and verifiable)
Feasible
Comparable – over time and across companies
The project report concentrates on traditional intangible assets based in IPR rather than looking at less traditional value drivers within organisations. Importantly, the project does not address fundamental problems such as how to identify critical intangibles in an organisation or how to assign value.

This project consisted of a consortium of eight university schools of business or economics in seven EU countries including well known academics in the field (e.g. Edward Truch, Director of the Henley forum). The PRISM acronym encapsulates the main themes of a multi-disciplinary European initiative aimed at gaining deeper understanding of the issues surrounding the management and measurement of intangibles. These are: Policy-making, Reporting and measurement, Intangibles, Skills developments and Management. The project not only addressed the development of market practices and new business models for intangibles but created a set of 15 case studies, four of which feature small to medium-sized enterprises (SMEs) (Courtney & Holtham 2003, p.7). The project report was published in October 2003 (Eustace 2003) and makes widespread policy and reporting recommendations. A classification system for intangibles is proposed, and there is again an emphasis on IPR. Interestingly, the project report calls for an extension of data collection methods for intangibles (Eustace 2003, p.8).

“A major barrier to consider is whether users understand how to engage with this information. This shifts the focus from the production of indicators to their consumption and the involvement of the user community in the developmental stage.”

This represents one of the key difficulties with intangibles research, that of not engaging with those users in organisations to discover intangibles that are recognised by them as useful and relevant. The view that users of intangibles ought to be involved in identifying and measuring them has influenced the research design for this thesis. The need to engage with senior managers to discover what information assets and attributes are important to them was seen
as a critical step. A comparison of the MAGIC, MERITUM and PRISM projects is shown in Exhibit 11.

Exhibit 11. MAGIC, MERITUM AND PRISM COMPARED

<table>
<thead>
<tr>
<th>Intangibles area addressed</th>
<th>MAGIC</th>
<th>MERITUM</th>
<th>PRISM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benchmarking</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classification</td>
<td></td>
<td>✓ ✓</td>
<td></td>
</tr>
<tr>
<td>Software tools</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement and management</td>
<td>✓ ✓ ✓</td>
<td>✓</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>User groups</td>
<td></td>
<td></td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Case studies</td>
<td></td>
<td></td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Expert groups/forums</td>
<td>✓ ✓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As seen in Exhibit 11, the PRISM project shows a clear movement towards more user-oriented approaches which were lacking in the earlier MAGIC and MERITUM work. It is yet to be seen whether this approach will prove worthwhile.

**Accounting regulators**

The second area identified by Canibano et al. (2000) as critical to the development of intangible assets is the work of accounting regulatory bodies. In June 2002, the UK Accounting Standards Board (ASB) published proposals for updating the Operating and Financial Review (OFR) which make recommendations to directors on items to include in annual reports. The proposals (ASB 2002) include a new recommendation which suggests that Directors discuss the strengths and resources of a business, such as its brands and product research. Interestingly, discussing performance in the context of business objectives is recommended. This means that discussion of future performance related to people management and customer support may become much more common.
Despite the progress evidenced by the updating of the OFR, research by Fincham and Roslender (2003, p.ix) on the implications of intellectual capital management for business reporting highlights the need for the UK accounting profession to “become better acquainted with the expanding stock of developments in accounting for intellectual capital”. Fincham and Roslender (2003, p. vii) are careful to differentiate intellectual capital from traditional intangible assets. They argue that intellectual capital refers to a much wider range of assets than those traditionally recognised (e.g. goodwill, brands, company reputation). The role of “knowledge-based intangible assets” in value creation is central and the authors argue that this approach will be far more successful than the more traditional valuation realisation approach to intangibles advocated by the MERITUM report (Fincham & Roslender 2003, p.15).

The research project undertaken by Fincham and Roslender (2003) involved a series of interviews with a variety of managers in six companies and with twelve experts. They found that managers did recognise key knowledge-based assets such as people, customers and knowledge networks. Managers did not, however, recognise the term “intellectual capital”. This did not mean that they were unaware of the importance of “what the intellectual capital concept incorporates, nor that they did not focus sufficient attention on it” (Fincham & Roslender 2003, p.viii). There was, however, a collective lack of understanding about the possibilities for intellectual capital reporting. Indeed, Fincham and Roslender (2003, p.ix) conclude that “the process of managing and accounting for aspects of intellectual capital in the UK has just about reached the limits of possibility”. The authors call for the UK accounting community to look at exemplars of intellectual capital reporting from the Nordic countries, arguing that these intellectual capital statements may be used as a basis for a more general business reporting model which would include intellectual capital. Although progress has been made in recent years in both producing guidelines for the management and measurement of intangible assets and in accounting standard reform, there is still a great deal of work to be done.
2.7 Information assets as intangible assets?

The perspective offered by this thesis is that information as an asset has attributes that make it significant and dynamic. While a quantifiable value for information assets may not be attainable management of information assets benefits from attention to value considerations. Value concentrates the mind on those positive aspects of information as an asset that can enhance the effectiveness of an organisation (see Exhibit 12). A resource-based view of information and its definition as an asset is useful as it can perhaps change the perceptions of senior managers towards information, even if it does not result in any financial valuation being made. This is because senior managers are familiar with the concept of traditional assets such as property and plant representing value to a business (KPMG/IMPACT 1994).

Exhibit 12. Information assets and organisational effectiveness

A focus on the effects of attributes of information assets is in effect a focus on the long-term future economic benefits of information assets. Challenging traditional attempts at information valuation was critical to the development of this model. The traditional approach was described by senior executives and information managers interviewed for this research as “going down a blind alley”. They recommended looking at the ways in which information added value to organisations. This led to a new definition of information assets as:

“Information assets comprise resources that are or should be documented and which promises future economic benefits”.

This definition also reflects the need to develop a definition of information assets which was acceptable to both accounting and information professionals.
For example, the concept of “potential value” used in the Hawley Report (KPMG/IMPACT 1994) is particularly difficult in financial reporting. Potential value involves prediction based on subjective interpretation of expected benefits (Sterling 1970, p.13). Such benefits cannot be predicted with any certainty; hence potential value is an unverifiable indicator. Future economic benefits are therefore proposed as an alternative definition which, while it does not resolve the problem of prediction, has a sound basis in accounting theory.

The concept of future economic benefits is already used in the accounting definition of assets (ASB 1999). While accounting does not easily accommodate information assets, it is useful to situate information assets within an accounting framework. This is despite the fact that, in accounting, only those items that can be expressed in terms of money are recorded. Information assets are usually recorded as costs, and so they appear as expenses rather than as assets, thereby colouring the perceptions of senior managers. To be accepted as an asset in financial reporting terms, information assets would have to fulfil recognition and definition requirements under accounting rules. A key requirement for recognition is future economic benefits. An asset can be recognised in accounting terms if it gives:

“rights or other access to future economic benefits” (ASB 1999).

This definition accommodates the increasing recognition of intangible assets in accounting standards (ASB 1999). Licensing and patenting agreements mean that organisations do not have to own assets to gain benefits from them (Davies et al. 1997, p.97). An organisation which has no information assets cannot generate future economic benefits from them, but information assets, when leveraged, can point the way to commercial opportunity. Information assets can thus be recognised as accounting assets in that they give rights and access to future economic benefits.

The definition of information as an asset is a separate issue to that of recognition. Here the control and separability of the information asset is
critical. Control in the context of the definition of an asset means the ability to obtain future economic benefits and restrict the ability of third parties to gain such benefits. Therefore, “items that cannot be separately identified from the business as a whole cannot be individually controlled by the entity and hence are not assets” (Davies et al. 1997, p.97). As information is typically diffused through all aspects of the business (Davenport 1993, p.79), it is extremely difficult to separate information from the activities it underpins. Selling an information asset would, in many cases, mean selling an entire business. This requirement that an asset must be “separable” and "controllable" by the entity, that it be capable of being sold separately from the business, means that, in principle, information cannot be defined as an asset, although it can be recognised.

Many traditional and non-traditional assets would also not meet these criteria but, as the market for commercial information (for example, customer information details) grows, the boundaries between these assets are becoming blurred. These might be described as “tomorrow’s assets” being knowledge-based and largely intangible as opposed to “yesterday’s” largely physical and tangible assets. It is therefore proposed that information assets should be seen to have a role in creating future economic benefits.

Concentration on seeking a value of information or measuring its financial and economic benefits can be a distraction from the very real role which information plays in organisations. This role is most evident in the concept of information as “lubricant” which facilitates smooth operations and which binds together organisational activities and supports organisational members in decision-making. While the value of information cannot be readily demonstrated, it is evident in the value which an organisation creates in a multiplicity of activities from product development to marketing to customer and employee involvement. Information underpins all of these activities but cannot be said to be the central element of any one of them. Its value lies in enabling these activities and allowing them to work together. Without information, things would grind to a halt.
2.8 **Attributes of information assets**

If information assets themselves cannot be valued or recognised as intangible assets, then perhaps their attributes can provide a mechanism whereby users can attempt to gain a more complete picture of them. Capturing these attributes is a tall order and has a long and varied treatment in the literature.

Repo (1986, p.374) lists the unique attributes that information possesses:

1. Information is human. It exists only through human perception.
2. Information is expandable. The free flow of information maximises its use.
3. Information is compressible.
4. Information is substitutable. It may save money by substituting the use of other resources.
5. Information is easily transportable by using applications of new information technology.
6. Information is diffusable. It tends to "leak" even if we try to contain it.
7. Information is shareable; giving it away does not mean losing it.

Burk and Horton (1988) argue that it is the role which information plays that defines it as an organisational resource, not its similarities to other resources. Information has value in encouraging innovation and change. Information has identifiable and measurable characteristics (Burk & Horton 1988, p.18). These measurable characteristics can help to define its value and include:

1. Quality of the information itself.
   Degree of accuracy, comprehensiveness, credibility, relevance, simplicity and validity.
2. Utility of information holdings.
Degree of intellectual and physical accessibility, ease of use, flexibility and presentation.

3. Impact on productivity of organisation.
Contribution to improvement in decision-making, product quality, efficiency of operation, or working conditions, time-saving and promotion of timely action.

Contribution to new markets, improved customer satisfaction, meeting targets and objectives and promoting more harmonious relationships.

5. Impact on financial position.
Contribution to cost reduction or cost saving, substitution for more expensive resource inputs, increased profits and return on investment (Burk & Horton 1988, p.93).

Many of the attributes identified by Repo (1986) and Burk & Horton (1988) are revisited by Orna (1996, p.20):

1. Information must be transformed by human cognition.
2. Where inflows of information necessary to maintain knowledge and support appropriate action are blocked, disaster can follow, either quickly (as in aircraft disasters) or in the form of a gradual run down of competence and chaos.
3. Where information is hoarded for the exclusive use of a limited number of people, it can actually fail to achieve its full potential value for those who hoard it. If it is exchanged and traded the value resulting from its use increases for all parties to the transaction.
4. Information has no inherent value in itself.
5. Information is a diffused resource that enters into all activities of businesses and forms a component of all products and services that are sold.

The elements identified by Repo (1986), Burk & Horton (1988) and revisited by Orna (1996) cover three distinct types of attributes. These are: attributes inherent to information, attributes concerned with the impact of information, and economic attributes of information.

**Inherent attributes**

The first two characteristics identified by Burk and Horton (1988), quality and utility, can be seen to be inherent to information as an entity in itself. They can be identified and measured according to a set criterion within a particular context or organisational setting. Attributes such as expandable, compressible, storable, transportable and substitutable (Repo 1986) also fall into this category.

**Impact attributes**

Impact attributes include productivity and effectiveness. These are not so readily identifiable or measurable. The main difficulty is that information, although useful, is in all likelihood only a tiny factor in any productivity or effectiveness improvements. While information underpins improved productivity and effectiveness, it cannot be easily separated from all the other elements that impact on these areas. To have this impact information must be “transformed by humans” (Orna 1996, Repo 1986). Information also has an impact in encouraging innovation and change (Burk & Horton 1988, p.93).

**Economic attributes**

The economic attributes of information are their most interesting. Burk and Horton (1988) include an economic category of financial impact. However, it is very difficult to show any financial impact from information, other than cost (which reduces rather than increasing profit).
Economic attributes identified by Arrow (1984, p.142) which emphasise the inappropriability of information actually exclude it from definition as an economic good. This is because information once transferred becomes the possession of both buyer and seller:

"...information is inappropriable because an individual who has some can never lose it by transmitting it" (Arrow 1984, p.142).

This means that the same information can benefit both the giver and receiver. Unlike a traditional economic good, for example a car, information can never really become the sole possession of the receiver. If I have an idea and I share it with another person, then not only does that person benefit but I can still retain and benefit from that idea. Value is added by the sharing of information (Orna 1996) since both parties are able to use it to enhance their activities. The attributes of exchanged and traded identified by Orna (1996) are also economic attributes and there is evidence, for example, the selling of customer information data, to support their inclusion as economic attributes.

Inherent, impact and economic attributes of information assets are summarised in Exhibit 13.

Exhibit 13. Attributes of information assets

<table>
<thead>
<tr>
<th>Inherent attributes</th>
<th>Impact attributes</th>
<th>Economic attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No inherent value (Orna 1996)</td>
</tr>
</tbody>
</table>
All three categories of attributes of information assets may be under-recognised by senior managers because they underpin everyday organisational activities rather than appearing as revenue-generators. Indeed the attributes described in the literature may not be those relevant to senior managers. While it is very difficult to identify the value of individual attributes, their effects on the strategic activities of organisations, on their competitiveness and decision-making processes, can be more readily shown. In other words, they can be shown to enhance the effectiveness of organisations. (Attributes of information assets identified from the literature e.g. currency, accuracy (Burk & Horton 1988), shareable (Arrow 1984; Orna 1996), expandable (Repo 1986) and comprehensiveness (Burk & Horton 1988) were used in a focus group exercise (see Chapter 5) with information managers to ascertain their relevance today).

2.9 Organisational performance
This section explores the concept of organisational performance. It attempts to describe some of the areas where information as an asset might be employed by organisations to enhance organisational effectiveness and, by extension, organisational performance. Indeed, for the purposes of this thesis the terms organisational effectiveness and organisational performance are to some extent interchangeable, although as shown earlier in Exhibit 4 they are substantial concepts in their own right. It also explores links between information and enhanced organisational performance evidenced by improved business strategy, competitive advantage and decision-making.

2.9.1 Organisations – definition
There are many definitions of organisations in the information management, business and accounting domain. March and Simon (1964, p.4) use a biological analogy to describe an organisation:

“Organisations are assemblages of interacting human beings and they are the largest assemblages in our society that have anything resembling a central coordinative system.”
The phrase "interacting human beings" is an important one for this thesis. The decision to participate in organisational activities reflects the different motivations of individuals. An organisation is made up of many different individuals and they interact at many different levels. The basic survival of any organisation is dependent on a range of internal and external influences working together in the building and maintaining of an organisational coalition (Cyert & March 1992, p.31; Wilson & Chua 1993, p.25).

As outlined in Chapter 1, the definition of an organisation adopted for this thesis is based broadly on that proposed by Barnard (1938). Barnard (1938, p.6) states that "the survival of an organisation depends upon the maintenance of an equilibrium of complex character in a continuously fluctuating environment of physical, biological and social materials, elements, and forces." This "continuously fluctuating environment" described by Barnard might also usefully include information. Information has a role in underpinning a diverse range of organisational activities which meet the individual and collective interests of a diverse group of stakeholders. This gives information a unique role in enhancing the effectiveness of the organisation and so, in effect, improving organisational performance. The definition of an organisation adopted for this thesis is therefore an information-centred one. This definition also recognises the diverse range of stakeholders who bring a range of information needs and contributions to their organisations and the need for these to be maintained within the organisational coalition if the organisation is to survive. The addition of information to Barnard's (1938) description provides the definition:

"the survival of an organisation depends upon the maintenance of an equilibrium of complex character in a continuously fluctuating environment of physical, biological and social materials, elements, and forces, and information."
It is interesting to speculate that, if Barnard had been writing today, would he have included information within his description and if so, where would he have placed it? The definition adopted in this thesis implies a knowledge-based or information-centric view of the organisation which is very different from the economic-based view which prevailed in Barnard’s time. An economic-based view of the organisation is concerned with predicting the behaviour of organisations in external markets while a knowledge-based view of the organisation sees the organisation as a knowledge-integrating entity (Grant 1996, p.109).

Sveiby (1997, p.27) describes the knowledge-based organisation as one of “both increasing and diminishing returns” in contrast to the industrial paradigm of “diminishing returns”. The knowledge-based organisation is an information-intensive organisation. Information-intensive organisations are defined by Porter and Millar (1985, p.158) as having either potentially high information intensity in the value chain (the value chain is described in section 2.10.1, see Exhibit 18) or potentially high information intensity in the product.

Information intensity in the value chain is characterised by:

“a large number of suppliers or customers with whom the company deals directly; product lines with many varieties, many parts, many manufacturing steps or a long production cycle; or products that mainly provide information” (Porter & Millar 1985, p.158).

Information intensity in the product is characterised by:

“a product that mainly provides information, a product whose [sic] operation involves substantial information processing, a product whose [sic] use requires the buyer to process a lot of information, a product requiring especially high costs for buyer training, a product that has many alternative uses or is sold to a buyer with high information intensity in his or her own organisation” (Porter & Millar 1985, p.158).
The implication is that, in today’s knowledge-based economy, the vast majority of organisations can be characterised as being information-intensive, adding value through information-intensity in the value chain and to products. As such the role of information in enhancing the effectiveness of such organisations and, by extension, their performance is greatly increased. Another important characteristic of today’s organisation is demonstrated in the ability to transform into new and interesting roles through individual and organisational learning.

2.9.2 Organisational learning

The impact of organisational learning on the definition of organisations is also critical. If the purpose of an organisation is not just to survive but to also add value and create new assets then this implies a learning process.

Senge (1990, p.4) argues that the:

"Organisations that will truly excel in the future will be the organisations that discover how to tap people’s commitment and capacity to learn at all levels in an organisation."

An early definition of organisational learning proposed by Argyris (1977, p.116) saw it as process-based:

"Organisational learning is a process of detecting and correcting errors."

Organisational learning has been perhaps best defined by Crossan et al. (1999, p.524) as:

"The transference of learning from individuals and groups through the learning that becomes embedded — or institutionalised — in the form of systems, structures, strategies and procedures."
The point at which individual learning becomes organisational learning is not obvious. As Senge (1990) points out, however:

"Organisations learn through individuals who learn. Individual learning does not guarantee organisational learning but without it no organisational learning occurs" (Senge 1990, p.139).

The willingness of individuals to convert personal learning to organisational learning has many similarities to the critical issue of when information becomes an asset of the organisation rather than of the individual.

2.9.3 Ownership of information assets

An information-centred definition of the organisation and the ability to transform through organisational learning is critical to an understanding of today’s organisation. However, while organisations seek to collect and structure knowledge in retrievable formats and so increase its reusability, the most critical tacit knowledge cannot be formalised in this way and, as such, cannot be owned by the organisation. In other words, today’s organisation is bounded by concepts of yesterday’s organisation such as ownership of assets. Such tacit knowledge (i.e. that achieved by indwelling) remains within the ownership of employees of the organisation and its leveraging is dependent on communication, making connections and employee involvement (see Exhibit 14). This all occurs within an environment of trust. According to Roos et al. (1997, p.25) only trust can make knowledge flow inside the organisation, generating a shared world of experience.

Exhibit 14. Ownership and leverage of information assets

<table>
<thead>
<tr>
<th>Owners - Organisation</th>
<th>Owners - Individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leverage Value</td>
<td>Leverage Value</td>
</tr>
<tr>
<td>Explicit e.g.</td>
<td>Tacit e.g.</td>
</tr>
<tr>
<td>Collected</td>
<td>Communication</td>
</tr>
<tr>
<td>Structured</td>
<td>Connections</td>
</tr>
<tr>
<td>Formalised</td>
<td>Involvement</td>
</tr>
</tbody>
</table>

TRUST
Communities of practice which bring together experts and users in common subject or interest areas (Conway & Sligar 2002) have emerged as a context for disseminating and reusing tacit information without necessarily structuring it in formal and perhaps limiting ways. Communities of practice are defined as:

“A group of people who share common experiences, lessons learned, and knowledge assets in a commonly defined or unified area of interest. Communities provide participants with reassurance, continuity and structure regardless of the members’ location, rank or expertise” (Conway & Sligar 2002, p.221).

This supports Orna’s (1999) definition of information, which positions the transformation of knowledge as critical. This also means that organisations do not have to own information to gain benefits from it. However, the ownership of information assets is a critical issue for investment decision-making in organisations. Organisations which cannot claim ownership of an asset are unlikely to invest in it, even though such investment may be essential for its long-term effectiveness. Communities of practice attempt to address this by creating opportunities to leverage value wherever it is held in the organisation and across time zones and cultures (see Exhibit 15). It positions people as a critical part of the leveraging process. To move from an asset-centric to a value-centric approach is critical for organisations which seek to create value.

Exhibit 15. Communities of practice (adapted from Conway & Sligar 2002, p. 87)
Exhibit 15 shows a Community of practice made up of People communicating using supporting technology across Time zones and Cultures. The Community of practice provides a Structure which facilitates communication by overcoming these boundaries.

What is apparent from the above discussion of organisational learning and the ownership of information assets is that it is much easier to identify and measure outputs from an industrial age organisation than it is to identify and measure those of the learning organisation. This is why organisational effectiveness is such a useful concept with which to view the learning organisation. Organisational effectiveness recognises that, while financial measures are necessary, they are not sufficient indicators of organisational performance (Lowe & Soo 1980, p.63). Organisational effectiveness is therefore a useful concept with which to view information-intensive learning organisations as it allows for the inclusion of non-traditional outputs which have no financial basis but may have far-reaching implications for the long-term survival and success of the organisation.

2.9.4 Organisational effectiveness

Lewin & Huber (1986, pp.516-517) define organisational effectiveness from a variety of perspectives including:

"human resource management, sociotechnical systems, strategic management, contingency theory and population ecology."

Organisational effectiveness has not been well-defined from an information perspective. This may be because, while information can be recognised as a core resource, its use is often so fundamental that it is not perceived as being a separate resource in organisations (Abell 1994, p.236) and is therefore perceived as unlikely to impact on organisational effectiveness. However, by addressing the effect which attributes of information assets have on key organisational goals such as developing business strategy, gaining competitive advantage and improving decision-making, it may be possible to raise awareness of the impact of information assets on organisational effectiveness.
The idea that an organisation which is becoming more or less effective over time can be seen to be ensuring or endangering its survival is also important. This provides a very basic indicator of organisational health which can be used to assess managers’ perceptions of their organisations’ future success or, in some cases, lack of success.

Models of organisational effectiveness

A number of models of organisational effectiveness have been developed. These include the: goal attainment model, system resource model, internal process model and constituency satisfaction model based on Cameron’s typology of organisational effectiveness (Cameron 1986; Cullen 1998). These models have been applied by Cullen (1998, p.7) to the library and information field. These four models describe the ways in which organisations tend to measure their “effectiveness”.

Goal attainment model

In the goal attainment model management in the organisation assesses its effectiveness in terms of the extent to which it achieves its goals and objectives. These may be focused on acquiring inputs from the environment, increasing outputs, for example, increased production, or establishing new services. Reporting, measurement and resource allocation are concentrated on the extent to which these goals are achieved. Goals may also be focused on achieving pre-determined standards or benchmarks. Heavy reliance on output measures usually indicates that much of the organisation’s endeavours are focused on increasing outputs, and therefore on goal achievement (Cullen 1998, p.8).

Georgopoulos and Tannenbaum (1957, p.535) rejected the goal attainment model in favour of the system resource model. This was because they considered that definitions of an organisation’s success should include not only the objectives of the organisation but also the mechanisms by which it maintains and pursues its objectives. The goal attainment model was also discarded by Seashore and Yuchtman (1967) in favour of the “system resource” approach to organisational effectiveness. Under the system
resource conceptualisation, effectiveness is defined by Seashore and Yuchtman (1967, p.393) in terms of the ability of an organisation to secure an advantageous bargaining position in its environment and to capitalise on that position to acquire scarce and valued resources. This leads Seashore & Yuchtman (1967) to a definition of organisational effectiveness as “the ability to exploit its environments in the acquisition of scarce and valued resources to sustain its functioning” (Seashore & Yuchtman 1967, p.393).

System resource model
In the system resource model management in the organisation measures its effectiveness in terms of its ability to gain resources from its environment. These are input measures. Traditionally, libraries have concentrated on and have measured themselves and reported in terms of: the size of the budget, number of staff, number of qualified staff, staff publications, the size of the collection, strengths of the collection, etc. Successful libraries have been considered to be those which secured more extensive resources from the environment, and translated them into these ostensibly desirable outputs. Library statistics, and benchmarks of minimum staffing levels for a particular population, building standards, and area per capita for users, staff qualifications and collection size reflect this model (Cullen 1998, p.8). Katz and Kahn (1966, p.170) define the system resource perspective as “the maximisation of return to the organisation by all means”. In other words, the system resource model is a short-term approach which is, perhaps, closer to efficiency rather than effectiveness.

Drucker (1974) wrote extensively on organisational effectiveness. He emphasised the difference between being effective and being efficient, two concepts which were often seen as being interchangeable:

“Effectiveness is the foundation for success-efficiency is a minimum condition for survival after success has been achieved. Efficiency is concerned with doing things right. Effectiveness is doing the right things” (Drucker 1974, p.45).
Pfeffer and Salancik (1978, p.33) describe efficiency as an **internal** standard of organisational performance. Efficiency measures are easy to obtain but are difficult to interpret because efficiency measures involve assumptions of causality and a level of theoretical understanding. Efficiency is relatively value free, it asks how much is produced and at what cost. Too much efficiency may detract from the effectiveness of an organisation (Pfeffer & Salancik 1978, p.36)

Effectiveness is an **external** standard applied to the output or activities of an organisation. It is applied to all individuals, groups, or organisations which are affected by or come into contact with the focal organisation. An assessment of effectiveness involves how well the organisation is meeting the needs or satisfying the criteria of the organisation (Pfeffer & Salancik 1978, p.34).

**Internal processes model**

In the internal processes model, the emphasis is on the organisation’s internal communications systems, and the efficiency with which it converts inputs into outputs. A feedback loop is an important component of this model. Measures which report ratios of transactions per staff member, number of items added to stock per staff member, and early work on the use of library statistics for decision-making focus on this model (Cullen 1998, p.8).

**Constituency satisfaction model**

In the constituency satisfaction model, the organisation looks outward to its different constituencies or stakeholder groups and measures its effectiveness in terms of the extent to which the needs of these different constituencies are being met. The competing demands of these various groups must then be managed. Goals and objectives, and all other ways of measuring performance are constrained by the need to demonstrate to the more powerful constituencies the extent to which their desires are being met. This is essentially a marketing model, and one that recognises the need for marketing to the internal as well as the external customer. This model is also known as the “participant need satisfaction approach” (Lowe & Soo 1980, p.68).
Organisations may employ one or more of the models described. Measures they select for use or the way in which they report, may reflect more than one of the models outlined. Effectiveness measured according to the dimensions of one model may not be compatible with effectiveness as measured according to the dimensions of another (Cullen 1998, p.9). The four models also do not deal adequately with the notion of outcomes, for example, greater customer satisfaction, as distinguished from outputs, for example, improved production. Lowe and Soo (1980, p.68) emphasise that determining effectiveness involves not only asking “what the organisation is doing or is trying to do?” but also “what is the organisation seeking to do?”

Cameron and Quinn (1988, p.7) identify characteristics of effective organisations which have appeared in the literature but the paradoxical natures of which have been ignored:

- Loose-coupling— which encourages wide search, initiation of innovation, and functional autonomy — as well as tight coupling which encourages quick execution, implementing innovation and functional reciprocity.
- High specialisation of roles — which reinforces expertise and efficiency as well as high generality of roles which reinforces flexibility and interdependency.
- Continuity of leadership — which permits stability, long-term planning and institutional memory - along with infusion of new leaders which permits increased innovation, adaptability and currency.
- Deviation amplifying processes — which encourage productive conflict and opposition, that energise and empower organisations as well as deviation-reducing processes, which encourage harmony and consensus, needed to engender trust and smooth information flows.
- Expanded search in decision-making — which allows for wider environmental scanning, access to more information, and divergence of input, as well as the creation of inhibitors to information overload —
which reduce and buffer the amount of information reaching decision-makers and lead to convergence in decision-making.

- Disengagement and disidentification with past strategies which foster new perspectives and innovation and inhibit defining new problems simply as variations on old problems as well as reintegration and reinforcement of roots which foster commitment to a special sense of organisational identity and mission and past strategies.

Highly effective organisations were paradoxical in that they performed in contradictory ways to satisfy contradictory expectations (Cameron & Quinn 1988, p.14). This may be explained by the issue of equifinality: where different conditions and causes may give rise to the same outcomes (Kaye & Little 1996, p.34). The impact of political and social factors is an area of enormous interest.

The constituency satisfaction is the model most relevant for the development of this thesis. The existence of the organisation depends on the ability of a wide range of stakeholders to remain in coalition. Various interest groups within and external to an organisation will also have diverse information needs and uses. Each group contributes information and uses information contributed by others and, in this way, they build sufficient information to remain in the organisational coalition. The nature of the groups and the fulfilment of such diverse needs are shown in Exhibit 16 (Wilson & Chua 1993, p.25).
Importantly, only when all interest groups are retained within the coalition will the organisation survive. This is a basic pre-requisite of an effective organisation. In Exhibit 16, the dark shaded area represents the organisation, i.e. the point at which all the players come together, while each ellipse represents stakeholders and the universe of opportunities available to each of these stakeholders. These stakeholders, for example, managers, blue collar workers and white collar workers, not only have an interest in the organisation of which they are currently members but are also free to move out of the coalition to pursue other opportunities in their respective ellipses.

Government is represented in the coalition as it impacts on the organisation by performing a regulatory and legislative role. Owners, i.e. shareholders, impact by taking an interest in the viability and profitability of the organisation. Customers require goods and services of acceptable quality. Suppliers require the organisation to maintain financial liquidity if they are to be retained in the coalition or they may also move. The task of retaining all of these interest groups in the coalition is a complex one. If any one interest group leaves the organisation or ceases to co-operate within it (as in the case...
of blue collar workers going on strike) then it is at risk. Individuals may attain their own goals (e.g. promotion by collaborating within organisations and organisations may offer inducements such as bonus payments to individuals).

The following definition of organisational effectiveness based on an outcome-oriented and process-based approach, as described by Cullen (1998) and Drucker (1974), has been adopted for this thesis:

An organisation is effective to the extent that it achieves what it sets out to achieve and the route to this involves doing the right things.

The definition by no means covers all of the issues raised in this section, but it provides an indication of the complexity of organisational effectiveness while limiting it to the fulfilment of organisational goals and the processes which are undertaken to achieve these. Participants in the case study research were asked to provide their own definitions of organisational effectiveness (see Chapter 6).

2.10 Organisational performance and information assets
The proposal for a link between organisational performance and information is a tentative one. Such a link has long been discussed in the information science literature (Allen 1966) but until recently there has been little progress made in establishing a coherent link (Marchand 2000, Marchand et al. 2001a, 2001b; Orna 2004).

Allen (1966), in his famous study of the use of scientific and technical information by research teams, found that better performers (information gatekeepers) used internal sources of information more while poorer performers used outside sources which they tended to overrate. Better performance of research teams was not linked by Allen to improved organisational performance. We still know very little about the connection between information and organisational performance. Attributes of information, such as quality and utility, are well documented but their impact
on organisational performance is unclear. This may be because information cannot be easily separated from other factors which influence organisational performance, such as the information-seeking behaviours of research teams.

Progress has been made in recent years, particularly by a team of researchers at the Institute of Management Development (IMD), working with the support of Accenture, the management consultancy firm, and led by Donald Marchand. A twenty-eight month research project entitled “Navigating Business Success” was conducted by the team at the IMD between September 1997 and December 1999. The project involved over 1200 senior managers in 103 companies across 26 industries and 37 countries (Marchand et al. 2001b, p.xv).

The research study sought to discover how people, information and IT interact to affect business performance (Marchand et al. 2001a, p.9). The research provides a context for the development of information strategies through the interaction of three information capabilities. “Information strategy is the detailed expression of information policy (an information policy is founded on an organisation’s overall business objectives and the priorities within them) in terms of objectives, targets and actions to achieve them for a defined period ahead” (Orma 2004, p.8). The three information capabilities described by Marchand et al. (2001a) are:

1. The information technology practices capability (ITP).
2. The information management practices capability (IMP).
3. The information behaviours and values capability (IBV).

Together, these three capabilities interact to form an integrated “Information Orientation” (IO) measure. This measure provides senior managers with an integrated new business metric to help build business capabilities and behaviours for effectively using information in their companies to achieve better business performance (Marchand et al. 2001b, p.48).
Marchand et al. (2001b) found that senior managers had a complex and comprehensive view of effective information use that integrated dimensions of behavioural, information management and IT thinking. This integrated view is, according to Marchand et al. (2001b, p.7), a much better predictor of organisational performance than any single view.

**IT Practices (ITP)**
The senior managers’ perception of IT practices is concerned with the practical outcomes of applications of IT in supporting organisational operations, processes, innovation and managerial decision-making (Marchand et al. 2001b, p.49). Marchand et al. (2001b, p.72) concludes that, while IT strategies may work well to achieve intended strategies, IT practices alone will not lead to superior organisational performance.

**Information Management Practices (IMP)**
Information management practices are seen as a process or life-cycle (see Exhibit 17) that involves: sensing, collecting, organising, processing and monitoring information to enhance its use for decision-making.

Exhibit 17. Life-cycle of information management (Marchand et al. 2001a, p.76)
Sensing in an important element of the life-cycle process, but it is often ignored in traditional definitions of information life-cycles (Best 1996, p.4). Sensing involves the active seeking and scanning of new information in external environments. Information sensed about the external environment helps define information needs and drives changes to what information would be collected within an organisation. Marchand et al. (2001b, p.98) found that senior managers perceive all of the five separate stages of the information life-cycle as being “distinct and valued ideas.” However, it was found that while “the sensing phase does exist as a discrete dimension in the minds of senior managers the concept is not as well formulated as other information management practices”. In particular, sensing information on economic, social and political changes affecting the business seems to be least developed in formal information practice. The practices associated with sensing information are less structured than the other life-cycle stages (Marchand et al. 2001b, p.93).

It is interesting to note that the senior managers interviewed for the Marchand et al. study were also less concerned with monitoring information than with using information. Monitoring information was perceived slightly less clearly than processing, collecting and organising information. Managers perceived updating and refreshing information for future use as being more significant than the reuse of existing information (Marchand et al. 2001b, p.91). Marchand et al. (2001b) concludes that managers do recognise that time and financial resources expended in collecting quality information will be wasted if it is not maintained. However, reusing information is a lesser priority than having information available when you need it.

Information behaviours and values (IBV)
Marchand et al. (2001b, p.94) identified a linkage between positive information usage behaviours and good information management practices which is most evident in sensing practices. The argument is that “those people who actively use cognitive skills to sense for information will also make better evaluative judgements about the applicability of certain information to decision contexts” (Marchand et al. 2001, p.94).
The information behaviours recognised by senior managers include:

- “Integrity - guarantee the information is truthful.
- Formality - formal information resources are perceived to have higher reliability and quality.
- Information control - provision of trustworthy and formal information related to individual and organisational performance.
- Transparency - treating errors, mistakes, failures and surprises as constructive learning opportunities accelerates the feedback loop between a company’s intended strategy, its actions to implement the strategy and the ability to correct or change course along the way (Marchand et al. 2001b, pp.102-103). (Openness and transparency in relation to single and double loop learning have been discussed in the learning organisation literature (Senge 1990; Argyris & Schön 1996).
- Sharing - managers’ willingness to share the most important information in the organisation about their own and the company’s performance with employees.
- Proactive information use - active concern to think about how to use information, obtain new information and the desire to put useful information into practice” (Marchand et al. 2001b, pp. 125-126).

Senior managers did recognise that people should use information to respond quickly in the competitive environment of the company (Marchand et al. 2001b, p.126). Senior managers do not believe that improvements in information behaviours alone, without the support of solid IT practices or competent information practices, will result in substantial improvements in business performance. It is the interaction of the three capabilities, the IO, which is the significant indicator.
The IO (Information Orientation) measure

The IO measure developed is intended as a business measure of effective information use. IO is not a measure of overall organisational performance, but it is a powerful measure of how senior managers perceive their companies possess the capabilities associated with effective information use to achieve enhanced organisational effectiveness. There are several key characteristics of IO:

- IO incorporates a people-centric view of information use.
- IO is causally linked to business performance.
- IO is an organisation-wide metric, not limited to the IT department or other information management support functions.
- IO applies universally across international borders.
- IO can be used as a key performance indicator over time to assess the effectiveness of management actions to improve information behaviour and values, information management practices and IT practices (Marchand et al. 2001a, pp.11-12).

While the IO is a significant advance in the linking of information and organisational performance, a caveat to the research is given by Orna (2004) when she looks back over a career in information consultancy which spans over 50 years. Orna (2004, pp.115-116) states that her long experience of information consultancy in organisations points to a much more limited practice by senior managers of the information behaviours and values quoted by Marchand et al. Orna (2004, p.116) points to information integrity in particular:

"The sorry trail of corporate wrongdoing, based on deliberate flouting of information integrity, and ultimate exposure initiated by the Enron case should act as an awful warning."

The three major themes which run throughout the work of the Marchand (2000) and Marchand et al. (2001a, 2001b) research are business strategy,
competitive advantage and decision-making. These themes helped to develop
the thinking behind the interview guides used with senior managers in the case
study work and will be discussed next.

2.10.1 Business strategy
Strategy in a business enterprise refers to matters such as the kind of enterprise
we are in, who our major competitors are, what our unique selling propositions
are, the key markets we sell to and strategies with respect to diversification
(Horton 1993, p.1). The information manager can only discover what strategic
information is if he/she is aware of the strategic issues faced by his/her
(1985) value chain as an appropriate framework for thinking about the
relationship between strategic thinking and information. The value chain (see
Exhibit 18) is the chain of activities of an organisation, at each stage of which
value is added to a product or service (only if the product or service is sold).
The value chain can thus be used as an indicator of where information is
critical to the effectiveness of the organisation, in helping the organisation to
“do the right things”.

Exhibit 18. Porter’s value chain
The existence of a strategic information policy or plan positions information so that it is brought within the remit of senior management and a critical step in the value chain. Within this context, the role of strategic information management is defined as:

"Strategic information management seeks to position information management as an integral (not a peripheral) part of the organisation's goals" (Horton 1993, p.1).

The concept of strategic information management proposed by Horton (1993, p.2) identified five guiding principles of strategic information management in organisations:

1. "Information assets are major assets of the business and must be managed accordingly.
2. Information investments should be made only in support of the business's goals and objectives.
3. Senior managers and employees throughout the organisation are custodians of the information assets they use and as such they have a major responsibility, within corporate constraints, to use the information effectively and efficiently and to share it internally and externally.
4. End users are accountable for the planning, management and control of the information assets they collect or produce, process and store, deliver and use.
5. There is a formal management approach to the management of life cycle phases of information assets, beginning with creation and following through all the way to retirement and disposition".

In the context of these five guiding principles, strategic information management becomes the attempt to relate information issues to business strategies. The benefit is that the organisation's members begin to see clearly the link between information and organisational objectives. If information
assets do not form a part of the strategic plan of the organisation, then they are unlikely to have the identification, management and protection they need and the organisation is unlikely to gain benefits from them. Awareness of a link between information and business strategy is an essential step in the recognition of the benefits of information asset management by senior managers.

2.10.2 Competitive advantage

Two important studies (Porter & Millar 1985; Marchand 2000) discuss the concept of using information to gain competitive advantage.

Porter and Millar (1985, p.150) identified three strategies for gaining competitive advantage:

- **Cost advantage** where the “firm sets out to become the low cost producer in its industry”.
- **Differentiation** where “in a differentiation strategy a firm seeks to be unique in its industry along some dimensions that are widely used by buyers”
- **The third was “focus” which Porter described as “quite different from the others because it rests on the choice of a narrow competitive scope within an industry”**.

While all of these strategies are possible a word of caution is given by Hamel and Prahalad (1996, pp. 241-242) when they question the ability of managers to think long-term, a necessary pre-requisite for gaining competitive advantage from information:

“Few managers are visionaries. Look up the synonyms for management and you will discover administration, supervision and governance. Managers live in the here and now.”
Marchand (2000) argue that the management of information enables organisations to compete by enabling the creation of business value and this is a concept that can perhaps be much more easily recognised and accepted by senior managers. Marchand (2000, p.7) describe a strategic information alignment framework that comprises managing risks, reducing costs, adding value and creating new reality:

- managing risks involves the management of market, financial, legal and operational risks;
- reducing costs involves the lowering of costs by eliminating unnecessary and wasteful activities and automating the improved processes;
- adding value involves using information to create value via the services and products offered to customers, for example, using customer profiling to build relationships; and,
- creating new reality involves using information to innovate, invent new products, provide better services and create new business opportunities (Marchand 2000, p.7).
Exhibit 19. Strategic information alignment framework (Marchand 2000, p. 25)

The diagram shown in Exhibit 19 suggests that there are some ways in which information has value that are better than others. The organisations which use information to create new reality and add value with customers on the vertical axis contrast sharply with companies that operate on the horizontal axis where minimising risk and reducing cost are the key drivers. Some organisations will always be more advanced in their recognition of the ways in which information can add value and these, according to Marchand (2000, p.26), are best placed to compete with information.

In a more recent UK study of using information to create business value in a sample of London legal firms, a range of small, medium and large firms were surveyed and managers with strategic responsibility for information were interviewed (Broady-Preston & Williams 2004). The authors reported that finding a quantitative value for information proved problematic. All
interviewees, however, viewed quality information provision as a source of competitive advantage. Information played a key role in organisational efficiency, enabling firms to differentiate themselves from the competition and improve their competitive advantage. By streamlining information provision to lawyers, time, and therefore cost-savings, could be passed onto clients, achieving customer benefits (Broady-Preston & Williams 2004, p.9).

2.10.3 Decision-making

Wilson (1973, p.152) says that the "essence of good management is decision-making - the process of choosing among various courses of action. Such decisions relate to future outcomes and therefore involve decisions relating to uncertainty."

Herbert Simon (1957) suggested that decision-making in organisations is constrained by the principle of bounded rationality:

"The capacity of the human mind for formulating and solving complex problems is very small compared with the size of the problems whose [sic] solution is required for objectively rational behavior in the real world or even for a reasonable approximation to such objective rationality" (Simon 1957, p.198).

Simon identified three categories of boundaries: the individual is limited by his/her mental skills, habits and reflexes; by the extent of knowledge and information possessed; and by values or conceptions of purpose which may diverge from organisational goals (Simon 1976, pp.40-41, p.241). It is because individual human beings are limited in their cognitive ability that organisations become necessary and useful instruments (but only if there is effective and efficient communication between the components) for the achievement of larger purposes. Conversely, the organisation can alter the limits to rationality by creating or changing the organisational environment in which an individual's decision-making takes place.
The core idea of bounded rationality is that, rather than all alternatives and all information about consequences being known, information has to be discovered through search. The key scarce resource is management attention (March 1997, p.12). If managers are not directing their attention at the information assets which impact on their organisation’s performance then these are not being managed effectively and the organisation cannot derive benefits from them.

One area of decision-making which has seen recent work is investment decision-making. Central to progressing this area is the role of intangible assets in influencing investment decisions in organisations. Baruch Lev (2004) argues for what he terms an “asset mentality” since it drives management to view intangibles-related investment as long-term and gives a more reliable picture of a company’s position:

“Comprehensive data on a company’s intangible investments gives investors a more complete picture of a company’s capital than the one GAAP (Generally Accepted Accounting Practice) provides. These data, reflecting both tangible and intangible assets, will yield better metrics than such widely used measures of investment value as the market-to-book ratio*. GAAP already requires that certain identifiable intangibles acquired from other entities be reported as assets but not those developed in-house” (Lev 2004, p.115).

*The difference between the physical and financial assets of a company (its book value) and market capitalisation is called “market to book value” (this applies only to listed companies with market capitalisations).

In a study of IT investment, Hinton and Kaye (1996, p.415) argue that “it is the intangibility associated with IT investments which creates problems for the organisation in initially justifying, and later assessing, the costs and benefits of their spending”. A traditional accounting approach does not allow for the inclusion of “intellectual input” which may significantly enhance the value of

In discussions conducted with members of the Management Research Group (MRG) of the Institute of Management, Hinton and Kaye (1996) explored approaches to investment-decision making:

"By far the most popular reason for justifying IT investment focused on the issue of cost reduction... by contrast, decision-makers adopt a different perspective when assessing marketing investments. This perspective clearly focuses on a range of intangible and non-quantifiable measures" (Hinton & Kaye 1996, p.424).

Hinton and Kaye (1996, p.426) identified a "dichotomy between technology-centred investments and human-centred investments" whilst recognising that decision-makers use a variety of perspectives to make such decisions. The prevalence of the cost perspective in IT investments is in stark contrast to the more long-term or strategic perspective used in training and marketing investments. This ignores the value added by innovative or developmental investments which may result in competitive advantage or some evolution in current working practice (Hinton & Kaye 1996, p. 424).

2.11 Summary
A review of the significant literature in relation to the aims and objectives of the study revealed:

Information assets and attributes

- Information assets emerged from a resource-based view of the organisation.
- Attributes of information assets fall into three major categories: inherent, impact and economic.
- Economic attributes fuelled attempts at information valuation which were unsuccessful.
Future economic benefit proposed as a possible approach to managing information assets.

Ownership of information assets is a critical issue for investment decision-making.

Intangible assets

- Little progress has been made in the intangible assets field for two reasons: lack of suitable guidelines for reporting and focus of accounting standard setters on traditional financial reporting models.
- Senior managers recognise key knowledge-based assets and give them attention even if they do not recognise terms such as intellectual capital.
- Intangible assets can usefully be defined to include information assets.

Organisational performance

- Search for a link between information and business performance has had recent success.
- Senior managers recognise five distinct phases in the information life-cycle, including sensing information.
- Monitoring information is more important than reusing information.
- Impact of information on business strategy, competitive advantage and decision-making are constant themes in the search to link information management and enhanced organisational performance.
- Organisational effectiveness is an external measure, efficiency is an internal measure.
- Long-term performance and improvement over time are indicators of organisational effectiveness.
Also explored are definitions of data, information, knowledge, information assets, organisations and organisational effectiveness.

Two approaches to the definition of data, information and knowledge were identified, the common sense approach and the cognitive approach. A definition of information which could encompass data and knowledge was adopted:

**Information**  
"Information is what human beings transform knowledge into when they want to communicate it to other people" (Orna 1999, p. 8).

Information assets were broadly defined as non-traditional intangible assets which could include data and knowledge-based assets and which are similar to the accounting definition of an asset in promising future economic benefits:

**Information assets**  
Information assets comprise resources that are or should be documented and which promises future economic benefits.

The definition of an organisation is informed by a view of the organisation as a coalition dependent on the satisfaction of the needs of a diverse range of stakeholders. An argument for the inclusion of information in the organisational environment resulted in the following view of an organisation being adopted:

"the survival of an organisation depends upon the maintenance of an equilibrium of complex character in a continuously fluctuating environment of physical, biological and social materials, elements, and forces, and information."

Various models of organisational effectiveness were explored, with the constituency satisfaction model, being viewed as the most appropriate model
for this research. No agreed definition of organisational effectiveness emerged from the literature. A definition based on the achievement of organisational goals and the processes undertaken was adopted to emphasise the hidden role of information assets in achieving organisational effectiveness:

**Organisational effectiveness**

An organisation is effective to the extent that it achieves what it sets out to achieve and the route to this involves doing the right things.

2.12 Conclusion

The notion of a link between information and organisational performance has seen progress in recent years (Marchand 2000, Marchand et al. 2001a, 2001b; Orna 2004). The impact of information on business strategy, competitive advantage and decision-making has long been reported in the literature. There may be underlying reasons why senior managers do not recognise the value of information itself or indeed the value which information may bring to their organisations (KPMG/IMPACT 1994; Reuters 1995). This supports the aims of the research study in identifying information assets, their attributes, methods of identification, management, measurement and impact on organisational effectiveness, which are relevant to senior managers. This is an area of study which has not been adequately dealt with.

The role of information assets in enhancing organisational effectiveness has been proposed as a proxy for the measurement of information assets, such assets cannot be recognised under traditional accounting frameworks. Progress in the intangible asset field toward the creation of guidelines for the measurement and management of intangibles and the reform of accounting standard setting practice provides a glimpse of future possibilities for information assets to be included as intangible assets. However, progress is slow and a definition of information assets which points to value considerations in terms of future economic benefits was adopted rather than a traditional approach to information value based on cost.
CHAPTER 3

3. METHODOLOGY

The aim of this chapter is to describe the research methodology. The research methodology influences and directs the selection of research methods. Research methods employed will be discussed in Chapter 4.

Section 3.1 discusses the ontological and epistemological viewpoints which influence the choice of research approach.

Section 3.2 describes the research approach. An interpretative qualitative approach is outlined.

Section 3.3 considers qualitative interpretive research traditions.

Section 3.4 discusses limitations of the research including issues of reflexivity, validity and reliability.

The chapter concludes with a summary and conclusions on the appropriateness of the research methodology chosen.
3.1 Ontological and Epistemological Considerations

All researchers approach their subject with explicit or implicit assumptions about the nature of the social world and the ways in which it can be investigated. Such assumptions influence methodology (Burrell & Morgan 1979, p.1). Drucker (1999) argues that such assumptions are particularly relevant to qualitative research since they can exert influence on social phenomenon, a situation which is not possible within the physical world. Drucker (1999) points out:

“For a social discipline such as management, the assumptions are actually a good deal more important than are the paradigms for a natural science. The paradigm - that is the prevailing general theory - has no impact on the natural universe. Whether the paradigm states that the sun rotates around the earth or the contrary has no effect on sun and earth. A natural science deals with behavior of objects. But a social discipline such as management deals with the behavior of people and human institutions. The social universe has no “natural laws” of this kind. It is thus subject to continuous change. And this means that assumptions that were valid yesterday, can become invalid and, indeed, totally misleading, in no time at all” (Drucker 1999, p.4).

Stating the ontological and epistemological stance of the researcher can help to situate and position the research approach and locate it within a context that provides a lens through which to view the research findings (Burrell & Morgan 1979, p.1). This is because different ontologies and epistemologies are likely to incline researchers towards different methods. A view of the world as external and objective would lead to a quantitative deductive approach while a view of the world as socially constructed and experiential would lead to a qualitative inductive approach.
3.1.1 Ontological assumptions

The basic ontological question addresses the nature of existence. It asks whether the “reality” to be investigated is external to the individual or the product of individual consciousness (Burrell & Morgan 1979, p.1). Ontology asks “what is the form and nature of reality and what can be known about it?” (Guba & Lincoln 1994, p.108). This research study is concerned with rather abstract ideas concerning information assets, their attributes and how senior managers can recognise their value and use them to improve their organisation’s effectiveness.

The approach taken in this research study is that each individual has his/her own unique world view. This leads to an interest in understanding individual perceptions of information and its related concepts. The organisations within which individuals operate are also subjective and socially-constructed (Wildemuth 1993, p.450). As a result, the ontological assumptions are very much concerned with the limited nature of human reality. However, an external reality, made up of tangible structures, is also apparent, the social world exists independently of individuals. This approach is characterised as social realism. (Nominalism is the opposing view where the social world is made up of nothing more than concepts) (Burrell & Morgan 1979, p.4).

3.1.2 Epistemological assumptions

Epistemological assumptions concern the nature of knowledge. A definition of information which includes knowledge has been proposed in Chapter 2. This definition is necessarily influenced by the epistemological position adopted. Epistemology provides the foundation for how one might begin to understand the world and communicate this as knowledge to fellow human beings.
It asks questions such as:

- "What forms of knowledge can be obtained and how do we know what is to be regarded as "true" from what is to be regarded as false?"
- "Is it possible to identify and communicate the nature of knowledge as being hard, real and capable of being transmitted in tangible form or whether 'knowledge' is more subjective based on experience and insight?" (Burrell & Morgan 1979, p.1).

3.1.3 Some approaches to knowing

Empiricism

Empiricism holds that all knowledge is derivable from experience (Svenonius 2004, p.572). Logical positivism, a form of empiricism, is a theory of knowledge which contends that what should count as knowledge can only be validated through methods of observation, as in the physical sciences. All propositions can be characterised as true, false or meaningless (Wildemuth 1993, p.451). If a proposition does not assert something that can be validated or disproven by observation, then it is held that the proposition is devoid of meaning. This condition is expressed by the "Principle of Verification", which states that, in order to be meaningful, a proposition must be capable of verification. The totality of knowledge therefore consists of all meaningful propositions. A non-meaningful proposition (for example, truth is beauty) is not meaningful since it cannot be verified (Svenonius 2004, p.572). This might also apply to a phrase such as "Information is valuable".

The verification principle assumes the independence of theoretical and observational languages (Guba & Lincoln 1994, p.107). However, theories and facts are inter-dependent. If propositions and observations are not independent, then "facts" can be viewed only through a theoretical window and objectivity is undermined. As a result, different theories may well be supported by the same facts so that it is never possible to arrive by induction at
a single theory. This made Popper (1968) reject verification in favour of a theory of falsification using the well-known example of a million white swans which can never establish with complete confidence the proposition that all swans are white, but one black swan can completely falsify it (Guba & Lincoln 1994, p.107).

The positivist approach to knowledge poses difficulties for a concept such as information. The approach would require a definition of information as a message devoid of meaning. The meaning of information cannot be limited to the message itself, it gains meaning within a social context.

The picture theory of meaning

The reverential or picture theory of meaning also derives from an empiricist view of knowledge (Svenonius 2004, pp.574-575). The basic idea of picture theory is that a proposition has empirical meaning only if it corresponds to pictures (reality). The theory was proposed by the philosopher Wittgenstein. One objection to picture theory is that it assumes a universal form of language in which the meaning of pictures is prescribed. However, pictures can be interpreted differently (Svenonius 2004, p.578).

The picture theory of meaning when applied to information implies that thought, or what Wilson (2002) terms “comprehension”, is required to transform information into meaning. This presents a close connection between the user of information and the degree of meaning that can be derived. The education, training and cognitive ability of individuals thus influences their ability to be informed by information. However, information received by different people will be interpreted in different ways, just as pictures can be interpreted differently (Dervin 1992).

The picture theory of meaning cannot be usefully applied to information for this thesis since it implies that no information exists outside of the human thought process. The definition of information as an asset requires that information can exist independently within structures such as databases. The
use of information is still central however, since this is where the transformation process occurs.

The interpretative tradition
The interpretative tradition is firmly rooted in German idealism. German idealism owes much to the work of Immanuel Kant (1724-1803) who was one of the first philosophers to articulate its foundations. Kant argued that a priori knowledge must precede any grasp of empirical experience. He asserted that inherent organising principles existed within man’s consciousness by which all sense data was structured, arranged and understood. A priori knowledge was independent of sense data, the product of the mind and the thought processes. As such, the starting point for understanding the world lay in the realm of mind and intuition (Burrell & Morgan 1979, p.277).

Within the interpretative tradition the experience of the individual is paramount. This makes the interpretative model an appropriate epistemological approach for this research study. The interpretative approach allows the experience of individuals to inform rather than seeking objective facts.

The work of George Kelly (1955) to find a method of identifying how individuals construe elements of their social world is firmly rooted in the interpretative tradition. Kelly proposed a “Personal Construct Theory” (PCT) which assumed that humans’ mentally represent the world around them and formulate and test hypotheses about the nature of reality. Humans are continually exploring and developing an understanding of their world and, in doing so, they develop cognitive maps which then define and limit their behaviour. By discovering the personal maps of individuals, it is possible to understand their views of the world and possibly alter their maps and change behaviour (Easterby-Smith et al. 1991, p.85). This research study attempts only the discovering of the views of individuals regarding information but this is no small task.
3.2 Research approach
The research approach is essentially an interpretative qualitative one employing grounded theory. Grounded theory is defined as:

"the discovery of theory from data – systematically obtained and analysed in social research" (Glaser & Strauss 1967, p.1).

The importance of the subjective experience of individuals in the creation of the social world necessitates the choice of a qualitative inductive approach. The importance given to such subjective experience is influenced by my background as an information officer, researcher and student with many years experience in dealing with users of information. This experience inclines me toward a view where the principal concern is with understanding the ways in which the individual creates, modifies and interprets phenomena such as information. My experience in the workplace also points me towards viewing individuals within the context of organisations, where their use (and contributions) of information are focused by organisational strategies and goals.

3.2.1 Other possible research approaches
The use of alternative research approaches such as action research, critical theory and soft systems methodology was considered.

*Action research* according to Patton (2002, p.145) aims to answer concrete questions, support development and improve programmes. It is appropriate therefore for addressing specific issues rather than building a framework for discovering a domain such as information assets and their attributes.

*Critical theory approach*
According to Mills & Simmons (1995, p.9) we can "define a critical approach as one that takes as a starting point a concern to understand and change the way that organisational arrangements impact on people." Critical theory is concerned not only with how things come to be the way they are but also with
the wider truth or validity of what is currently the case (How 2003, p.3). The social construction of organisational life and its impact on human needs and growth provides an interesting lens through which to view information assets, however, the critical process of evaluation required for the critical theory approach was unsuitable for an essentially exploratory research area. The focus of the research study on organisational effectiveness was also at odds with the human-centred approach of critical theory.

*Soft systems methodology* focuses on explaining how and why a system as a whole functions as it does (Patton 2002, p.119). Soft systems methodology is not appropriate to a research study focused on exploration and discovery since the methodology is essentially evaluative.

However, Patton (2002, p.123) argues that it is useful and important to bring a systems perspective into qualitative inquiry, illustrating his argument with the wonderful example of nine blind people who encounter an elephant at a zoo:

“As the story goes, one (blind person) touches the ear and proclaims the elephant is like a fan. Another touches the trunk and says the elephant most surely resembles a snake. The third feels the elephant’s massive side and insists it is like a wall. Yet, a fourth, feeling a solidly planted leg, counters that it most resembles a tree trunk. The fifth grabs hold of the tail and experiences the elephant as a rope. And so it goes on, each blindly touching only a part and generalising inappropriately about the whole” (Patton 2002, p.123).

Patton (2002, p.123) explains that the usual moral of such a story would be that only by putting all of the elephant parts together in the right relation to each other can one get a complete and whole picture of the elephant. Yet, from a systems perspective, such a picture yields little real understanding of the elephant. To understand the elephant it must be seen and understood in its natural ecosystem, as one element in a complex system of flora and fauna. Only in viewing the movement of a herd of elephants across a real terrain,
over time and across seasons, in interaction with plants, trees and other animals will one begin to understand the nature of the evolution and nature of elephants and the system of which elephants are a part.

The usefulness of systems thinking in qualitative research is apparent in this story as it provides an all encompassing view of the issues at stake. Systems' thinking is used in the building of a grounded theory model for information assets. It provides a useful method to illustrate cause and effect, and helps to provide a more holistic view of the research.

3.3 Grounded theory and other qualitative traditions of inquiry
Cresswell (1998, pp.27-41) identifies five traditions of qualitative inquiry: biography, phenomenology, ethnography, case study and grounded theory,

Biography
Biography focuses on a single individual, emphasising stories and epiphanies of special events (Cresswell 1998, p.31). The biography was not appropriate for this research study since the research aim of identifying information assets and attributes necessitated a focus on a wider range of views of individuals than this tradition allows.

Phenomenology
The focus of a phenomenological study is gaining a deeper understanding of the nature or meaning of lived experience (Patton 2002, p.104), or getting at the essence of the experience of some phenomenon. It emphasises what people experience and how it is that they experience what they experience (Patton 2002, p.104). Phenomenological traditions in sociology and psychology vary in their choice of unit of analysis, group or individual (Cresswell 1998, p.53) and this presents difficulties in applying phenomenological methodologies. It is not an appropriate approach to this research which, while it is concerned with the individual experience of information, is more generally focused on how individual perceptions of information influences its use and impacts on value creation for organisations.
Ethnography

Ethnography is defined by Vidich and Lyman (2000, p.38) as:

“describing ways of life of humankind...a social scientific description of a people and the cultural basis of their peoplehood.”

Ethnographic inquiry takes as its central assumption that any human group of people interacting together for a period of time will evolve a culture (Patton 2002, p.81). As a result an ethnographic study requires prolonged observation of a group. The researcher becomes immersed in the group’s day to day activities in order to gain an understanding of the meanings of behaviour, language and member interactions (Creswell 1998, p.58).

An ethnographic approach for this research study was rejected for the following reasons. Firstly, organisations and their members are constantly changing so that prolonged observation of any one group is problematic. Groups could be defined perhaps as “all senior managers” or “all information managers”. However, given the importance of individual perspectives on information to this research study, groups which could change their composition over time were unlikely to provide insights.

Secondly, the influence of organisational information, (i.e. the history and background of the organisation) is important to this study but not the central aim of the research. The importance of an Organisational Information “culture” is an area highlighted by Abell (1994, p.229) and Orna (1999, p.58). As will be explained later in this thesis, the term Organisational Information “Culture” was used as an Information asset in the Information asset-scoring grid developed for use in the case study research on the recommendation of the information managers’ focus group.

Finally, what makes the ethnographic approach distinct is the matter of interpreting and applying the findings from a cultural perspective (Patton 2002, p.84). While the organisational cultures encountered during the case study research were interesting, the major research aim was the identification
of information assets and their attributes and their impact on organisational performance. Ethnography was therefore felt to be an unsuitable approach.

Case studies
The case study's unique strength is its ability to deal with a full variety of evidence – documents, artefacts, interviews, and observation beyond what might be available in a conventional historical study (Yin 1994, p.8).

Yin (1994, p.4) identifies three types of case studies. These are: exploratory case studies, descriptive case studies and explanatory case studies. When to use each strategy is based on three conditions:

1. the type of research;
2. the extent of control an investigator has over actual behavioural events;
   and,
3. the degree of focus on contemporary as opposed to historical events.

Concentration on the types of research questions being asked helps to select a suitable method. "How?" and "Why?" questions are likely to favour the use of case studies generally. Relevant situations for different research strategies are delineated by Yin (1994, p.6) and are shown in Exhibit 20. The various strategies shown in Exhibit 20 are not mutually exclusive.
Exhibit 20. Case study - Situation and strategy

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Form of research questions</th>
<th>Requires control over behavioural events?</th>
<th>Focuses on contemporary events?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>How, why</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey</td>
<td>Who, what, where, how many, how much</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Archival analysis</td>
<td>Who, what, where, how many, how much</td>
<td>No</td>
<td>Yes/No</td>
</tr>
<tr>
<td>History</td>
<td>How, why</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Case study</td>
<td>How, why</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

This research study focused on asking “What are?” questions such as “What information assets has your organisation identified?” and these favour an exploratory case study. Four case studies were conducted for this research study. Interviews were the major data collection method with 45 senior managers being interviewed.

Grounded theory

While interviews were used as the major data collection method, the qualitative tradition adopted as a framework for this research study is grounded theory. In order that new models, concepts and theories can be produced it is necessary for researchers to engage in theory building and to try out relatively new methods such as grounded theory. The grounded theory approach is an inductive theory building process where the researcher observes certain phenomena and on this basis arrives at conclusions. A deductive or theory testing approach is the process by which the researcher
arrives at a reasoned conclusion by logical generalisation of a known fact (Sekaran 2003, p.27).

A grounded theory approach can provide relevant predictions, explanations, interpretations and applications (Glaser & Strauss 1967, p.1). It is well-suited to exploratory, inductive research where the aim is to gain an enhanced understanding of a domain. Grounded theory enables the researcher to focus on the ideas generated by the interviewees so that any theory that emerges is “grounded” in their views and concerns. This is particularly relevant in a management setting where the main managerial activities of planning, decision-making and control require substantial inputs of information (Wilson et al. 1992, p.3).

For this thesis, a grounded theory methodology enabled a theory of information assets to be generated which was based on in-depth interviews with senior managers. Such senior managers deal with information issues on a daily basis and perhaps have the greatest stake in the development of the information as an asset domain.

3.3.1 Issues surrounding grounded theory

One of the major issues surrounding the use of grounded theory is the reporting of the process undertaken to generate such theories. Partington (2000, p.9) says that:

“The approach to discovering theory from data known as grounded theory is much-cited, but little understood”.

Despite choosing what is a systematic approach, it seems almost bad practice among researchers to detail the process too clearly. Such clarity denies the necessary immersion in the data which is so close to the heart of qualitative researchers. Easterby-Smith (1991, p.112) notes that critics of the grounded theory approach “argue that research and analysis in qualitative data is about “feel” and an implicit component of all research is the honesty of the person
conducting the research”. This seems equally applicable to users of grounded theory themselves.

Secondly, the use of software packages known as QDA’s (Qualitative Data Analysis), to analyse qualitative data can confuse the basic steps which should form a grounded theory analysis. This is because the software (or software authors) have to design packages with the widest possible range of user groups in mind. This means that such packages are, to all intents and purposes, stand alone and one need have no knowledge of the grounded theory approach to use them. This results in a proliferation of terms and techniques which can all be very confusing. The use of software packages has many benefits in the organisation and analysis of large amounts of qualitative data. However, sight should not be lost of the basic steps for generating a grounded theory which can be carried out just as well with pen and paper, given a small set of interviews.

A QDA (Qualitative Data Analysis) software package, ATLAS/Ti, was selected for the analysis of the case study interview data. The selection and use of the software will be covered in Chapter 4. Some issues surrounding use of ATLAS/Ti and limitations of the research will be discussed in Section 3.4.

3.3.2 Seven steps of grounded theory
Easterby-Smith (1991, pp.108-112) describes seven steps in the grounded theory process:

1. **Familiarisation**

Familiarisation involves reading and re-reading all transcripts and noticing interesting things such as:

- Relationships between interviewer and interviewee.
- General attitude of interviewee.
- Using field notes or research diary.
- Assessing level of confidence of data.
- Looking for nuance.
The researcher should also go back and listen to the original tapes since he/she may pick up tones of voice or inflections which help with meaning. The message of the familiarisation step is that the researcher needs to know the data inside out.

2. **Reflection**

A process of evaluation and critique becomes more evident as the data is evaluated in the light of previous research, academic texts and common-sense explanations. The kind of questions asked during the reflection stage are:

- Does it support existing knowledge?
- Does it challenge it?
- Does it answer previously unanswered questions?
- What is different?

The researcher must be aware of previous research, models and ideas. This is usually achieved by a literature review.

3. **Conceptualisation**

Conceptualisation involves the formulation of sets of concepts or variables which seem to be important to what is going on.

4. **Cataloguing concepts**

In a manual system this involves the transfer of concepts onto index cards for quick reference.
5. **Recoding**

It may be noted that some concepts were used within different contexts or were used to explain different phenomenon. Or different people in the same organisation were defining differently what appears at face value to be similar concepts. Concepts may be merged or renamed at this stage and this reduces duplication of variables. The process by which concepts emerge is known as constant comparison (Glaser & Strauss 1967, p.105).

6. **Linking**

Linking refers to a process of linking all the variables into a more holistic theory. It involves tacking backwards and forwards between the literature and the evidence collected in practice.

7. **Re-evaluation**

Re-evaluation requires re-visiting the data to assess whether more work is needed in some areas. The analysis may have omitted to take account of some areas or over-emphasised others.
The seven steps are shown in Exhibit 21.

Exhibit 21. Seven steps of grounded theory

The critical part of the grounded theory process for this research study was the linking of concepts indicating that such concepts have more than one important relationship. Such linked concepts can be seen as more important than those that have no relationships with other ideas. Through linking, relationships are built between concepts, and so gradually a grounded theory emerges. This implies a linear process. However, Exhibit 21 shows Reflection and Re-evaluation as feeding into and out of the Linking stage, as part of an iterative cycle. This iterative cycle more accurately reflects the actual grounded theory process in my view.

3.4 Limitations of the approach adopted
It is recognised that there are limitations of the approach adopted. Limitations concerning the use of case studies and grounded theory will be outlined first. Then more specific limitations concerning issues of reflexivity, validity and reliability will be outlined.
3.4.1 Limitations of the case study method

The major limitations of the case study method for this research study are issues concerning sampling and time and financial constraints.

**Sampling (external validity)**

The case study does not represent a "sample" (Yin 1994, p.6) in any traditional sense. A limitation of a qualitative case study approach is that a single researcher cannot study a large number of cases. Therefore, the generalisability of the findings is limited. The aim of the research study was to focus strategically and meaningfully on issues surrounding information and its use rather than on representation. An argument for the generalisability of case study research has been proposed by Kennedy (1979) in her seminal article "Generalising from Single Case Studies." Kennedy (1979) argues for establishing rules for drawing inferences about the generality of qualitative findings from a case study, rules of inference that reasonable people can agree on. The experimental scientist tends to study specific cases in order to draw inferences (deduction) about the general case, the practitioner draws on knowledge of the general case to form interpretations of, and actions in, the specific case (Kvale 1996, p.233).

Kennedy (1979) draws on practical case scenarios in law and medicine to highlight the differing approaches. In case law it is the most analogous preceding case, the one with the most attributes similar to the actual case that is selected as the most relevant precedent. The validity of the generalisation hinges on the extent to which the attributes compared are relevant, which again rests upon rich, dense, thick descriptions of the case (Kvale 1996, p.233). In case law, the court decides whether a previous case offers a precedent that can be generalised to the case being tried:

"Thus it is the receiver of the information who determines the applicability of a finding to a new situation...Like generalisations in law, clinical generalisations are the responsibility of the receiver of information rather than the original generator of information and the
evaluator must be careful to provide sufficient information to make such generalisations possible" (Kennedy 1979, p.672).

Kvale (1996, p.234) points out that issues arise as to who should conduct the analytical generalisation from the qualitative case study research, the researcher or the reader and user. In science, it is the researcher who builds up and argues for the generality of his or her findings, through statistical procedures and assertational logic. For the legal and clinical case it is the judge or the clinician who makes the judgement of whether a previous case was sufficiently analogous to be used as a precedent for the present case. In both instances the key is that sufficient information is provided by the researcher so that analytical generalisations can be made (Kvale 1996, p.234).

**Time and financial constraints**

The case study approach is also constrained by both financial and time constraints.

**Financial constraints**

With limited financial resources the researcher cannot cover a wide geographical area conducting in-person interviews as opposed to postal or telephone surveys within a reasonable timeframe. The fieldwork undertaken for this research study was funded by the AHRB so that a relatively large number of interviews (45) was secured and a great deal of preliminary research was carried out. However, it would have been useful to extend the study outside of the UK, perhaps to organisations in the Nordic countries as these have been highlighted as particularly open to ideas concerning intangible assets such as information (Fincham & Roslender 2003).

**Time constraints**

The case study is a very time-consuming approach in terms of access to the sites, conduct of interviews, transcription of the interviews, and analysis of the large amount of data generated.
A great deal of time and effort was expended in gaining access to senior managers and their organisations. The nature of the subject area is such that it is limited to those with an interest in opening up their information practices to outside scrutiny. Access to participants was a particularly difficult issue and is discussed in detail in Chapter 4. Interviews were also time-consuming, but in a good way. Senior managers had very strong opinions and ideas about information management in their organisations and welcomed the opportunity to talk and provide insights.

The transcription of the interviews was essential to facilitate the use of the qualitative data analysis software employed in the analysis of the case study data. Bergeron (1997, p.14) says that a good transcriber takes an average of four hours to transcribe one hour of interview. AHRB funding did not cover transcription costs so these were covered by the researcher. This enabled more time to be spent on analysis. A large amount of data was generated both from the preliminary research and from the case study research. The use of software to enable data analysis was a key component in managing the wealth of data generated and this will be described in Chapter 4.

The case study approach allows the collection of rich data from key informants about their perceptions of the phenomenon under study (Yin 1994, p.8). As such it is an appropriate choice as the major data collection method.

### 3.4.2 Limitations of grounded theory

Many of the limitations of grounded theory are those of qualitative research in general [e.g. reflexivity (which is ignored by grounded theory), validity - both internal and external, and reliability] and these limitations will also be outlined separately. One specific limitation of grounded theory, testing, will be highlighted in this section.
The grounded theory approach is aimed at developing theory rather than testing it:

"Of course a theory can be tested. Although validated during the actual research process, a theory is not tested in the quantitative sense. This is for another study" (Strauss & Corbin 1998, p.213).

However, the grounded theory approach does seek to develop testable theory:

"By offering a set of systematic procedures, grounded theory enables qualitative researchers to generate ideas that may later be verified through traditional logico-deductive methods" (Charnaz 1995, p.48).

The idea of testing grounded theory implies statistical generalisation and this requires survey techniques (Kvale 1996, p.232). The use of a postal questionnaire or survey for the exploratory research would not have been appropriate but could be employed in testing. In a quantitative sense, the grounded theory developed from this research has not been tested and this should be recognised not only as a limitation of the research design but also a potential area for future research.

3.4.3 Issues of reflexivity, validity and reliability

3.4.3.1 Reflexivity

Being aware that different “voices” and influences exist is part of the process of engaging with data and extracting meaning. Decisions are made about “whose” voices are heard in the process of selecting quotations. This gives the researcher a responsibility to engage in self-awareness and self-analysis so that attention can be paid to presenting findings that are fair and useful (Patton 2002, p.64). Aware that my natural instinct is to look at information as useful and valuable, I have attempted to see information from the perspective of those interviewed and to listen to their “voice”. To this end I have also selected research methods, such as repertory grid technique, which are useful methods for reducing observer bias (Stewart et al. 1981, p.4).
3.4.3.2 Validity

Cooper (1998, p. 85) describes the emergence of two broad classes of validity threats, internal validity and external validity.

Internal validity

Threats to internal validity relate to the direct correspondence between the experimental treatment and the experimental effect. To the extent that this correspondence is compromised by deficiencies in research design, the ability to interpret a study’s results could be called into question.

Another threat to internal validity is instability, defined as “unreliability of measures, fluctuations in sampling persons or components, autonomous instability of repeated or equivalent measures” (Cooper 1998, p. 86).

Construct validity and statistical conclusion validity are also important concepts. Construct validity refers to “the possibility that the operations which are meant to represent a particular cause or effect can be construed in terms of more than one construct”. Statistical conclusion validity refers to the power and appropriateness of the data analysis technique.

External validity

Threats to external validity relate to the generalisability of research results and have already been discussed in Section 3.4.1. One of the major difficulties in conducting qualitative research is that its transferability to other settings can be problematic (Marshall & Rossmann 1999, p. 192). Evaluating external validity requires assessing the representativeness of a study’s participants, settings, treatments, and measurement variables. Two broad classes of external validity are apparent: population validity, referring to generalisation to persons not included in a study, and ecological validity, referring to non-sampled settings.

Addressing each validity threat represents an increase in precision and accumulation of knowledge. By making rules of judgement open to criticism
and debate a crucial step is provided in making the research evaluation process more objective (Cooper 1988, p.87).

Strategies adopted for addressing internal validity

Triangulation

Triangulation is the major method employed to address the internal validity of the research. Strategies such as triangulation can be employed to counter the relatively weak position of the researcher in relation to the collection of data. For example, the case study method recognises that the researcher has little control over the events which he/she is studying (Bourner 1996, p.9).

Triangulation is not a magic bullet however. As pointed out by Denscombe (1998, p.86), triangulation corroborates and enhances validity, but it does not “prove that the data or analyses are absolutely correct”.

Denzin, as cited by Janesick (1994, p.214) identifies four types of triangulation:

1. Data triangulation: the use of a variety of sources.
2. Investigator triangulation: the use of several different researchers or evaluators.
3. Theory triangulation: the use of multiple perspectives to interpret a single set of data.

Methodological triangulation was used in this study. Methodological triangulation was used for two reasons:

1. Different methods allow contrasting viewpoints to be brought to the problem resulting in better and deeper understanding of the phenomenon (Morse 1994, p.224).
2. The data derived from each method can be used to confirm or corroborate the findings of the other method (Rossman & Wilson 1994, p.319).
The major data collection methods used were as follows:

- Repertory grid. (Five senior executives.)
- Open-ended guided interviews (Five senior executives, six internationally-active information professionals and 45 senior managers for the case studies.)
- Information asset-scoring grid. (Case studies.)

A focus group of senior British information managers was also used in the initial stages of the research to review and revise categories of information assets and attributes identified in the literature, and to help focus the research on issues relevant to practitioners.

The use of a variety of research methods also has value in equipping the researcher with an array of practical skills in running focus groups, conducting interviews, designing and automating data collection tools and, not least of all, analysing results from a variety of perspectives using a variety of tools.

Piloting the case study open-ended guided interview with five senior executives in information-intensive UK organisations also ensured that the issues addressed and their formats are valid (see Exhibit 3). Secondly, the creation of an interview database using the qualitative data analysis (QDA) software ATLAS/Ti increased the validity of the data collected by allowing systematic and coherent data analysis.

**Strategies adopted for addressing external validity**

Patton (2002, p.244) simply states that:

"There are no rules for sample size in qualitative inquiry."
Patton (2002, p.245) justifies this statement on the issue of sample size by saying:

"...the validity, meaningfulness, and insights generated from qualitative inquiry have more to do with the information richness of the cases selected and the observational/analytical capabilities of the researcher rather than the sample size."

The case study research sample did focus on senior managers in four information-intensive UK organisations. The selection of senior managers and information-intensive UK organisations represents a "theoretical sample." A "theoretical sample" is described by Patton (2002, p.238) as:

"the researcher samples incidents, slices of life, time periods, or people on the basis of their potential manifestation or representation of important theoretical constructs."

While the senior managers employed in the information-intensive organisations used for the case study research do not represent a sample as such, they provide a range of perspectives which are essential for the development of the information as an asset domain. The case study organisations were large and small, geographically-dispersed and located on one site, private and public sector, consultancy and manufacturing based. Senior managers interviewed ranged from Board Directors to Marketing Managers, all high level users and contributors of information assets. They provided an "information richness" which I believe is apparent in the research findings (see Chapter 6). The multiple case study design, in that it allows for cross sites analysis, also adds confidence to findings and helps increase the external validity of the data. However, the organisations which participated in this research were seen as primarily individual case studies. The extent to which they could be usefully compared was limited although similarities and differences were identified (see Chapter 6a).
A final important test to consider is plausibility or credibility which is demonstrated by the provision of sufficient evidence (Seale et al. 2004, p.414).

Having outlined some issues concerning internal and external validity and the strategies used to address them, it is worth pointing out that perhaps the most useful test of validity or trustworthiness for qualitative inquiry is whether research is “credible” (Lincoln 1985, p.296):

“The goal is to demonstrate that the inquiry was conducted in such a manner as to ensure that the subject was correctly identified and described. The inquiry then must be “credible” to the constructors of multiple paradigms” (Lincoln 1985, p.296).

In other words, an in-depth description of the research showing the complexities, processes and interactions will be so embedded with data from the setting that it cannot help but be valid. A summary of the boundaries of the research study is shown in Exhibit 22.

### Exhibit 22. Boundaries of the research

<table>
<thead>
<tr>
<th>Geographical</th>
<th>Type of organisation</th>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK only</td>
<td>Information-intensive public and private sector</td>
<td>Senior managers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Information professionals</td>
</tr>
</tbody>
</table>

3.4.3.3 Reliability

Reliability is the extent to which a measurement procedure yields the same answer however and whenever it is carried out:

“Reliability is the degree to which the finding is independent of accidental circumstances of the research” (Kirk & Miller 1986, p.20).
Typing errors
Errors can be made in the recording of data. Transcription errors can be a problem but these are minimised by careful attention to the primary data and can be minimised by techniques such as listening to the original tapes.

Coding errors
Ambiguous definitions or poorly thought out definitions can also lead to repetition and ambiguity in assigning codes to data. The predisposition of the researcher can lead to the favouring of one interpretation of an ambiguous code over another. Having the data coded by just one coder increases reliability in terms of reducing coding error, in that one coder will apply his/her interpretation fairly consistently. It will, however, be reliant on the objectivity of one person thereby increasing unreliability (Cooper 1998, p.95).

Measures taken to address reliability issues raised by Cooper (1988) in particular, for the case study data, which were the major data gathered, are outlined next.

Strategies adopted to increase reliability

Reducing typing errors
As mentioned earlier, the case study interview data was professionally transcribed. The transcription was performed by a professional typist, who had little knowledge of the specialist terms being used by the interviewees. For example, while the term “Internet” was typed correctly, Intranet was not recognised and so was not typed or in some cases wrongly taken for Internet. The researcher listened to all the tapes and checked them for the correct use of such terms. This helped to increase the reliability of the data and also provided a very good familiarisation route.
Reducing coding errors

Dealing with unanswered questions, creating rules for assigning codes and dealing with quantitative and qualitative data were all difficult issues to address. The open-ended guided interview schedule used for the case studies contained two basic types of questions.

These were:  
a) questions that required a Yes, No or Do not know answer.

b) questions that required qualitative statements or open-ended questions.

Yes, No or Do not know answers were coded as 0, 1, 2 in Excel. Codes were similarly created for missing data. Planning for issues such as missing data helps to reduce coding errors. A rating question (where respondents placed their organisation on a five point scale moving from Strongly Disagree (1) to Strongly Agree (5) in relation to statements on information strategy) also allowed quantitative analysis. However, respondents elaborated on their rating and the qualitative statements proved of much more interest than the quantitative scores. This meant that qualitative analysis prevailed.

Linking data in Excel with data in ATLAS/Ti became critical so that relationships between the quantitative and qualitative responses could be explored. The numeric codes in Excel were mirrored by YES NO or DO NOT KNOW alpha codes in ATLAS/Ti to provide this link. These codes did appear out of place among more qualitative codes. Codes were also assigned to help organise the interview data which covered five broad themes. These themes were coded so that data could be output for all interviewees' answers to one theme.

Given the opportunity to undertake this analysis again it would have been far easier to analyse all the data in ATLAS/Ti using alpha codes. The temptation to use the quick and easy-to-use Excel to provide quantitative scores proved too great. This led to a duplication of effort, especially recoding of quantitative data in ATLAS/Ti. The qualitative analysis undertaken was very focused on identifying themes and concepts that were emerging from the interview data.
These proved to be the much more interesting findings giving rise to a set of categories that eventually formed the basis of a grounded theory of information assets. It may in fact have been wiser to have used only qualitative questions in the interviews, but at the time it seemed useful to have both quantitative and more detailed qualitative questions to create a more interesting interview guide.

Another issue to address is the reductionist approach to data that grounded theory requires. The end point of a grounded theory analysis could be perhaps a single code which would reflect all of the concepts and themes that emerge from the data. This approach was not followed as it would have necessitated the merging and deleting of numerous codes for information assets and attributes which needed to be retained as these were critical findings for the research study. This approach was time-consuming, but it did result in a rich stream of qualitative data. Dealing with these issues goes beyond reducing coding errors, but it is useful to clarify the thought processes which resulted in data analysis decisions which necessarily impact on coding practice. A more detailed overview of the data analysis approach taken to the case study interviews will be given in Chapters 4 and the findings are presented in Chapter 6.

3.5 Summary
An inductive qualitative research approach based on explicit ontological and epistemological assumptions has been outlined. Social realism and the interpretative research tradition combine to encourage an individualistic research approach focused on exploration rather than confirmation. Case studies and grounded theory have been discussed as the major qualitative research traditions employed. Limitations of case studies and grounded theory have been identified. In particular, issues relating to the sampling of case study organisations and the testing of grounded theory have been discussed. Wider issues concerning reflexivity, validity and reliability and some of the strategies employed to address these issues for this research study have also been discussed.
3.6 Conclusion

Qualitative inquiry is particularly oriented toward exploration, discovery, and inductive logic. This does not mean that the findings of such research are any less "credible" than more traditional quantitative research. In a research study concerned with the identification of information assets and their attributes an interpretative qualitative research approach is particularly useful since it allows new concepts to be explored. Information as an asset, attributes of information assets and the value of information is an established research area, yet it is still largely unexplored, especially in relation to issues such as value creation and organisational performance. The implication is that there is still much to be discovered necessitating a choice of methodology (grounded theory) that enables close engagement with those responsible for, and concerned with, the management of information in organisations.
CHAPTER 4

4. DATA GATHERING

This chapter describes the major methods employed for data collection.

The introduction, Section 4.1, outlines the major data collection methods, subjects and date of collection.

Section 4.2 provides an overview of the major data collection method, interviews, and describes the selection of interviewees.

Section 4.3 describes the focus group method and its selection as an appropriate vehicle for this research.

Section 4.4 describes the selection and use of the repertory grid technique and the use of open-ended guided interviews with five senior executives.

Section 4.5 describes the use of open-ended guided interviews with six internationally-active information professionals.

Section 4.6 describes the case study research method, the recruitment of 45 participants, the process of the case studies undertaken and discusses approaches to the analysis of the case study data.

A summary of the data gathering strategies employed is given in Section 4.7. The chapter concludes with a section on the strengths and weaknesses of the data gathering strategies employed, Section 4.8.
4.1 Introduction
This chapter describes the methods adopted to meet the aims and objectives of the research. A range of research methods was adopted including: focus group, open-ended guided interviews, repertory grid and case studies. The timeline of the data collection, data collection methods and subjects are shown in Exhibit 23.

Exhibit 23. Timeline, data collection methods and subjects

<table>
<thead>
<tr>
<th>Year</th>
<th>Method</th>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>Focus Group</td>
<td>27 senior British information managers</td>
</tr>
<tr>
<td>2001 (early)</td>
<td>Repertory grid exercise</td>
<td>Five senior executives</td>
</tr>
<tr>
<td></td>
<td>Open-ended guided interviews</td>
<td></td>
</tr>
<tr>
<td>2001 (late)</td>
<td>Open-ended guided interviews</td>
<td>Six internationally-active information professionals</td>
</tr>
<tr>
<td>2001/2002</td>
<td>Case study - Information asset-scoring grid</td>
<td>45 senior managers</td>
</tr>
<tr>
<td></td>
<td>Open-ended guided interviews</td>
<td></td>
</tr>
</tbody>
</table>

Findings from the focus group of senior British information managers, the repertory grid exercise and open-ended guided interviews with five senior executives and open-ended guided interviews with six internationally-active information professionals are presented in Chapter 5, Findings of preliminary Research. The preliminary research helped to focus and develop the research study and fed into the design of the case study phase. The case studies comprised open-ended guided interviews with 45 senior managers in four organisations and completion of an automated information asset-scoring grid. Findings from the case studies are presented in Chapter 6, Findings of Case
studies. For an overall summary of the research aims, subjects, methods and major findings, see Exhibit 3, Chapter 1, pp.30-32.

4.2 Research methods overview
Interviews were chosen as the major data collection method for this study. There are five advantages to using interviews for data collection (Gorman & Clayton 1997, pp.124-125):

1. "The most clearly apparent advantage with interviews is that data collection is immediate. With other methods of data collection, such as questionnaires, there is usually a long lead-time before data collection is completed.

2. Interviewing allows the interviewer to probe for more detail, especially where the interviewee makes a point that is unexpected or is unclear. Similarly, the interviewee is free to ask for clarification when in doubt as to the meaning of a question.

3. Interviewing allows the interviewer to explore causation. That is, to obtain from the interviewees their reasons for behaving in the manner in which they say that they do, something that is very difficult to achieve in a satisfactory way when using other methods of data collection, such as questionnaires or observation.

4. Another advantage of interviews relates to personal contact. It is sometimes easier to obtain data from an unenthusiastic respondent by the simple fact of being present. It is often more difficult to say "no" to someone's face than it is to put aside or ignore a questionnaire. Also, being present gives the interviewer the opportunity to reduce or eliminate the potential objections to being interviewed.

5. The final advantage of interviews is that they allow a large of amount of data to be collected in a fairly short time". 
There are also a number of disadvantages to interviews:

1. "The cost of carrying out interviews can be quite high in terms of both time and money.
2. Because interviews are conducted in a one-to-one situation, it is possible that interviewees may tailor their responses to fit what they think the interviewer wants to hear, anonymity is lost.
3. Lack of selectivity means that sorting out the important points from a large quantity of data can be difficult and may raise questions about selective reporting" (Clayton & Gorman 1997, p.125).

The advantages that interviews bring to this research study in terms of collecting rich qualitative data outweigh the disadvantages. Once interviewing was chosen as the main method of data collection, a decision had to be made regarding the type of interview to be used. This was influenced by the choice of interviewee (subject).

4.2.1 Interviewees

Senior managers in information-intensive UK organisations were the subjects for this research study. Information-intensive organisations were not necessarily those, the main activity of which was the production or consumption of information, but those in which organisational activities were heavily dependent on the effective management of information assets. The targeting of senior managers in information-intensive UK organisations was undertaken for a number of reasons.

The Hawley Report (KPMG/IMPACT 1994) identified the management of information assets as a key activity of boards of directors. Therefore, gathering the views of very senior managers, such as directors and chief executives, who were ultimately responsible for information assets in their organisations, was essential. The drawback of targeting this level of manager was that numbers of interviewees were necessarily limited since there are fewer senior managers than middle or junior managers in many organisations.
A second reason for targeting senior managers in information-intensive organisations was the influential nature of this group of managers. As Katz and Kahn (1966, p.311) point out:

 "Except in democratically constituted systems, only the top echelons of line and staff officers are really in a position to introduce changes."

The senior managers who participated in this research were those in long-term careers whose views have been developed over many years and who will continue to have influence in their organisations. Within information-intensive organisations such senior managers form a high-level group or an elite which represents the most influential people in the organisation. Targeting such groups is termed elite interviewing (Marshall & Rossman 1989, p.54). Elite interviewing focuses on the influential, the prominent, and the well-informed people in an organisation or community. These are the people who have both the will and the means to enact change in their organisations.

A third reason for targeting senior managers was the quality of data that could be collected. The senior level of the subjects helped to ensure that the research remains relevant over time. It is a characteristic of PhD research that the research study undertaken may become very quickly out of date and this is particularly true of the part-time researcher. In this research study the researcher was employed full-time on a funded AHRB research project while undertaking part-time PhD research which began in December 1999. The data collected for the AHRB research project entitled “The attributes of information as an asset, its measurement and role in enhancing organisational effectiveness” was used for the PhD research. The data collected was extensive and from several sources (including a focus group and open-ended guided interviews with five senior executives, six internationally-active information professionals and the 45 senior managers involved in the case studies). The high level of the subjects involved has helped to ensure its relevancy despite the fact that a significant period of time has elapsed since data collection began.
It is also one of the realities of funded research that there is often a great deal more data collected than can be analysed or published during the funding period. This applied in particular to the case study research which was carried out in late 2001 and 2002 and the broad findings of which have only been submitted to the AHRB in a final report in December 2002 but not published in any other form. The PhD study provided the opportunity to make much better use of the case study data than would otherwise have been possible.

All of the subjects interviewed for this research study can be identified as elites within their profession or organisations. The five senior executives, six internationally-active information professionals and 45 senior managers in the case study organisations were all influential people with many years' experience in their organisation or field. Elite interviewing requires a flexible interview approach, since such influential groups are expected to have strong views.

4.2.3 Types of interview
Patton (2002, pp.342-348) lists three major approaches to qualitative interviewing and identifies their strengths and weaknesses:

Informal conversational interview.
Data gathered from informal conversational interviews will be different for each person interviewed. Interview questions emerge from the immediate context and are asked in the natural course of things: there is no predetermination of question topics and wording. The strength of the informal conversational method is that it increases the salience of, and relevance of, questions. It offers a high degree of flexibility and spontaneity. A weakness of the informal conversational interview is that it may require a greater amount of time to collect systematic information because it may take several conversations with different people before a similar set of questions has been posed to each participant in the setting (Patton 2002, p.343).
Interview guide approach.
The interview guide approach provides topics or subject areas within which the interviewer is free to explore, probe and ask questions that will elucidate and illuminate that particular subject. Topics and issues to be covered are specified in advance, in outline form. The interview guide can contain some rough topics to be covered or it can be a detailed sequence of carefully worded questions (Kvale 1996, p.129). The interviewer decides sequence and wording of questions in the course of the interview. The advantage of this method is that the outline helps make interviewing a number of people more systematic and comprehensive by delimiting in advance the issues to be explored (Patton 2002, p.343). Its disadvantage is that important and salient topics may inadvertently be omitted if they are not brought up by the interviewee.

Standardised open-ended interview.
The standardised open-ended interview approach requires carefully wording each question before the interview. The exact wording and sequence of questions are determined in advance. All respondents are asked the same basic questions in the same order. The advantage of this method is that respondents answer the same questions thus increasing comparability of response. Data are complete for each person on the topics addressed in the interview which facilitates analysis. The weakness of the standardised approach is that it does not permit the interviewer to pursue topics or issues that were not anticipated when the interview was written (Patton 2002, p.347).

It is possible to use more than one form of interviewing within an interview and this approach is described by Patton (2002, p.347) as the “combination strategy”. In selecting an approach for this research the interview guide approach was first selected as the most suitable. Topics and issues could be specified in advance, thereby ensuring systematic data collection to aid analysis. The interview guide approach also gave a good degree of flexibility in ordering questions but a more open-ended approach was also employed to ensure that important issues that might arise could be included. This resulted in a more flexible interview schedule which allowed new issues to emerge and
to be addressed during interviews. This mix of approach allowed both structure and flexibility and this was essential to the level of interviewees being targeted. The mixed approach is described as open-ended guided interviews. Using a flexible rather than structured interview approach can help to reduce bias. Hannabus (1996, p.4) warns against the dangers of structured interviews and notes that participants “may feel obliged to fit their experiences” to the researcher’s template, or worse, “may even try to deceive the researcher”. The choice of interview technique is therefore critical to the elite interview.

4.2.4 Open-ended guided interviews

Open-ended guided interviews were conducted with three sets of interviewees. These were: five senior executives, six internationally-active information professionals and 45 senior managers in four case study organisations. Three different interview schedules were used (see Appendix-Interview schedules). In addition, the interviews with five senior executives were accompanied by a repertory grid exercise which was used to help identify information assets and attributes. The case study interviews were accompanied by an information asset-scoring grid exercise which provided an introduction to a range of information assets and attributes.

4.2.5 Conclusions on research methods selected

All of the research methods employed focus on individuals except for the focus group which was used to provide the research with relevance for practitioners by gathering the views of a senior group of professionals in the information industry. It should be noted that access to groups such as the 27 senior British information managers, the five senior executives and 45 senior managers in four case study organisations was facilitated by the funding of the AHRB. Participation in funded research which would have an impact on practice, was the deciding factor for interviewees. The data collection methods employed and the process of conducting the data collection will be outlined next.
4.3 Focus group with senior British information managers

The categories of information assets identified by the Hawley Committee (KPMG/IMPACT 1994) and attributes of information assets identified from the literature (Arrow 1984; Repo 1986; Orna 1996) were used as the basis of a discussion with a single group of 27 senior British information managers. This group can be broadly described as a focus group. A focus group can be defined as:

“a small group discussion (often consisting of six to 12 participants), guided by a facilitator and used to gain an understanding of participants’ attitudes and perceptions relevant to a particular topic” (Gorman & Clayton 1997, p.143).

The use of the focus group method allowed a range of participants from business, government, charities and information consultancies to discuss information assets and attributes so that a range of perspectives could be accessed. The information managers’ focus group also helped to provide the research with relevance for practitioners.

4.3.1 Aslib IRM Group

The 27 senior British information managers were members of the Aslib (a specialist information management organisation based in London and Brussels) IRM (Information Resource Management) special interest group. The group brings together senior information managers to discuss current topics of interest in the information field. Meetings are held roughly once a month. The format of the meetings is usually a short presentation followed by a group discussion. The IRM group changed its title to KMNET (Knowledge Management Network) in 2002 since its members felt this title better reflected the interests of the group.
4.3.2 The meeting
The meeting was held on Tuesday 23rd January 2001 at The King’s Fund, Cavendish Square, London. The meeting comprised a short presentation on the aims and objectives of the AHRB research study. This was followed by a presentation of an information asset and attribute scoring matrix which led to a group discussion. The discussions gave a basis for revising and updating the assets and attributes presented.

4.3.3 The Information asset and attribute scoring matrix

Information assets
Some small changes to the original listing by the Hawley Committee of information assets were made before presenting them to the information managers’ discussion forum. Eight categories of information assets were identified by the Hawley Committee (KPMG/IMPACT 1994, pp.9-10). These were: Market and Customer Information, Product Information, Specialist Knowledge, Business Process Information, Management Information, Human Resource Information, Supplier Information, and Accountability Information.

Initial changes made were:

**Market and customer information** was renamed **Customer information** to reflect the widening application of customer information to inform all aspects of business. (Customer Relationship Management (CRM) has brought this information asset to the fore).

**Competitor information** was added as a separate information asset. Exploring competitive advantage gained from information assets required its identification as a separate information asset.
Information attributes

As described in Chapter 2, a literature review was undertaken to identify attributes of information as an asset. Many of the attributes which have appeared in the literature over the years were summarised by Repo (1986). While all of these attributes are significant, two of them have long histories in the information and economics literature making them particularly interesting for discussion. These are the attributes “shareable” and “expandable”.

Attributes of information assets relating to utility are also well-documented. **Currency** and **accuracy** are necessary attributes for information assets (Burk & Horton 1988, pp. 91-99). Another attribute presented to the information managers’ discussion forum related to quantity of information. This attribute was proposed by Burk and Horton (1988, pp.91-99) and is comprehensiveness. This was renamed on the recommendation of the information managers’ discussion forum as **sufficiency for purpose** (sufficient) to reflect the idea that even a comprehensive information collection is not useful if it does not fulfil its purpose. These attributes were used to form the rows of the matrix of information assets. The various attributes cross-cut the different information assets as shown in Exhibit 24.
Exhibit 24. Information asset and attributes matrix

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Customer Information</th>
<th>Competitor Information</th>
<th>Product Information</th>
<th>Business Processes</th>
<th>Management Information</th>
<th>Human Resources</th>
<th>Supplier Information</th>
<th>Accountability Information</th>
<th>Specialist Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shareable</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expandable</td>
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<td></td>
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<td>Current</td>
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<td>Accurate</td>
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<td>Sufficient</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

The information assets and attributes shown in Exhibit 24 are by no means exhaustive, they focus attention on some of the important features of information and on the need to manage information actively. It is also possible to think about scoring or rating the importance of attributes to individual information assets when they are presented in this way. The question of how to measure or score attributes of information assets once identified is a difficult one and will be discussed in Chapter 5.
4.3.4 Conclusion on use of a focus group with senior British information managers

The focus group with senior British information managers provided an excellent opportunity to:

- Revise and update information assets and attributes for further research.
- Engage with practitioners and discuss issues of importance to them.
- The focus group method itself provided access to a large number (27) of senior British information managers, many at the top of their profession, which provided a practical focus for the research.
4.4 Repertory grid exercise and open-ended guided interviews with five senior executives

Repertory grid exercises and open-ended guided interviews were carried out with five senior executives. The repertory grid exercises aimed to identify attributes of information assets which were seen as being important by some of the most influential members of targeted organisations. The open-ended guided interviews addressed wider questions (such as responsibility for information assets and mechanisms for the identification of information assets) than the earlier focus group. These interviews were also used to pilot interview questions used in the case study interview schedule.

4.4.1 Recruiting participants

Five executives interviewed were from profitable UK information-intensive businesses. They were drawn mainly from professional contacts and were based primarily in the East Midlands. This is the location of Loughborough University and reflects links developed between the Department of Information Science and the Loughborough University Business School with local companies.

The executives were:

- the Finance Director of a large commercial services organisation (Company A);
- the Director of Strategic Planning of a well-known manufacturing company (Company B);
- the Head of Knowledge Management of a large FTSE 100 company (Company C);
- the Chairman of a successful market research company (Company D); and,
- the Finance Director of a second large commercial services organisation (Company E). (Some job titles have been slightly changed to provide for anonymity and brevity).
As elite members of their organisations, the five senior executives were each in a prime position to provide relevant and current views on the attributes of information assets considered significant by them. Their senior positions and wealth of experience is, however, balanced against the small number (5) of interviews obtained.

The senior executives were sent a formal letter in January 2001 inviting them to participate in the research and providing some background to the research. Four interviews were carried out in the offices of the participants between January 2001 and March 2001. The fifth interview (Head of Knowledge Management, Company C) was conducted by telephone at the request of the interviewee.

The interviews were structured in two parts. In the first part, the open-ended guided interview questions, covering the identification and management of information assets, were asked. In the second part, a repertory grid exercise was completed by each participant. The executives were asked to identify attributes of a given set of information assets, which included, for example, Customer information and Product information. The participants were asked to give an hour of their time, during which both the interview pilot and the repertory grid exercise would be conducted. The repertory grid exercise was time-intensive, so the majority of time was spent on this. The interview questions were relatively straightforward and were completed within the first 20 minutes of the time allocated.

4.4.2 Open-ended guided interviews with five senior executives

Open-ended guided interviews were conducted with the five senior executives. The interview questions sought to identify some of the issues involved in managing information assets for senior executives and their organisations. The aim was not only to pilot interview questions but to help to build a picture of how organisations and their members approach the management of information assets.
All the senior executives were asked the same five basic themed questions. These themes are shown below and can be seen in detail in Appendix-
Interview schedules:

- Who is responsible for managing information assets in your organisation?
- What is the role of information assets in your organisation?
- Have you identified any or all of the information assets you consider significant?
- What mechanisms are used for identifying and managing information assets?
- What problems are perceived in identifying information assets?

The executives spoke quite freely around the general questions asked, giving personal examples and experiences. A structured yet flexible approach seemed to help the thought process. The interviews also allowed participants to consider, in some cases for the first time, the information routinely held and used by them. Findings of the open-ended guided interviews are given in Chapter 5, Findings of preliminary research.

4.4.3 Selecting the repertory grid technique

The repertory grid technique was selected as a suitable research method for the identification of attributes of information assets. It allowed the five senior executives to freely describe attributes of information assets without prompting from the interviewer. Repertory grid is an established method which has been used in management development and change (Easterby-Smith et al. 1996, p.12). Some examples of applications are: job analysis, employee selection, task analysis and performance appraisal (Easterby-Smith et al. 1996, p.13). Repertory grids have also been used in clinical and educational settings and in classification studies (Beail 1985; Dillon & McKnight 1990).
Repertory grid has been identified as a useful method to reduce observer bias (Stewart et al. 1981, p.4). Observer bias has long been recognised as a major problem in conducting research. The interviewer's background, history and experience give him/her expectations about the world so that he/she recognises familiar things. The problem with this is that there is a tendency to turn less familiar things into those that resemble what the interviewer knows. Observer bias can have serious consequences, as shown in a widely-used example quoted by Stewart et al. (1981, p.4) of a new schoolteacher whose class was randomly split into two groups. The teacher was told that all the children had been tested and that Group A children were brighter than Group B children (although no difference in fact existed). At the end of term the children were re-tested and it was found that Group A children scored more highly than those in Group B.

The aim of the repertory grid exercise was to investigate whether those attributes of information, identified as important in the literature, were those considered important by senior executives. If they were not, this might explain why the importance of information was not recognised at senior management level (KPMG/IMPACT 1994). To investigate this, the senior executives needed to describe attributes of information assets without prompting from the interviewer. This, it was hoped, would result in a range of attributes being identified independently which could then be compared with traditional attributes. Problems of context would be eliminated as the attributes would be described by the executives themselves.
4.4.4 The repertory grid technique

The repertory grid technique has three main components:

- elements, which define the phenomenon to be investigated;
- constructs, which are the ways in which the person groups and differentiates the elements;
- linking mechanisms, which show how each element is judged on each construct. These are usually a set of observations and the constructs or criteria by which those observations are rated (Beail 1985, p.2).

Reducing observer bias depends very much on how repertory grids are administered. For example, when choosing elements, there are three strategies which can be adopted to generate elements. Each has its own advantages and disadvantages.

These strategies are:

1. The interviewer provides the elements.

2. Free response, where the interviewee names a list of elements spontaneously with the interviewer providing only a broad class from which to draw.

3. Using eliciting questions, with the answers to the questions forming the elements (Stewart et al. 1981, p. 35).

Either of the last two strategies helps eliminate observer bias. However, it means that if there is a particular element which the interviewer needs to introduce (for example, a particular brand of product which is being compared to others), then it cannot be assumed that the interviewee will introduce this element. With the first strategy, where the interviewer supplies the elements, the problem is that the elements may not be familiar to the interviewee, thus reducing the usefulness of the distinctions made.
4.4.5 Selecting elements (information assets) and Personal Construct Theory

When selecting elements, there are some general rules that can be followed (Stewart et al. 1981, p.33). Elements selected are most often people, objects, events and activities, in other words nouns and verbs. Elements should also be homogenous, that is, classes of elements should not be mixed and should not be sub-sets of other elements. For example, “Making presentations” and “Making presentations to the Managing Director” would be inappropriate. Elements should also not be evaluative; terms such as “Leadership” and “Communicating” fall into this area. A specific element will allow the interviewee scope to develop his/her evaluation.

An important point to remember when selecting elements is the repertory grid’s basis in Personal Construct Theory (PCT). George Kelly (Kelly 1955) proposed a “Personal Construct Theory” (PCT) which assumed that humans mentally represent the world around them and formulate and test hypotheses about the nature of reality. Humans are continually exploring and developing an understanding of their world and, in doing so, they develop cognitive maps which then define and limit their behaviour. By discovering the personal maps of individuals, it is possible to understand their views of the world and possibly alter their maps and change behaviour (Easterby-Smith et al. 1991, p.85). PCT asserts that humans can only understand what is meant by “good” by also understanding what is meant by “bad”. This means that the elements must allow contrasts to be made between them. This is important for the elicitation of constructs.
4.4.6 Elicitation of constructs (attributes)

Constructs are basically the reflection of how the individual views the world. The process for eliciting constructs appears simple but can quickly become more complex. For example, if we take three words representing elements, such as SHEEP COWS PIGS and write them on three separate cards, we can ask in what way any two of them are similar and the other different. The answer might be that Sheep and Cows eat grass and Pigs eat, well, anything. These answers would then form a bipolar distinction so that we have:

Eats grass -- Eats anything

These bipolar distinctions represent the dimensions the interviewee uses when he/she is thinking about the elements. These dimensions are called the constructs. The elicitation becomes more complex when we replace elements like sheep and cows with elements like my mother, myself and my boss (Stewart et al. 1981, pp.11-13). The constructs elicited for sheep, cows and pigs may be similar for many interviewees but those elicited for my mother, myself and my boss are likely to be widely differing. By using these triadic comparisons and asking for both a similarity and a difference, the repertory grid method allows equal focus on both poles of the construct. This means that a construct is not just composed of a phrase and its semantic opposite; it is also a contrast (Stewart et al. 1981, p.17). Each end of the bipolar construct can be made equally clear. This is much more difficult to achieve when elements do not have a clear-cut “good” and “bad” contrast, resulting in the possibility of more opposites being produced than bipolar constructs.
4.4.7 Conducting the repertory grid exercises

Four main steps were followed in conducting the repertory grid exercises.

These were:

- Step 1, the selection of elements or information assets;
- Step 2, the administering of the grid;
- Step 3, the elicitation of the constructs or attributes; and,
- Step 4, analysing the grids.

The four steps are described next and are supplemented by further discussion on the repertory grid method and on the attributes of information as an asset.

Step 1 Selection of elements or information assets

Nine information assets based on the Hawley Committee's identification of categories of information assets and the revisions generated by the senior information managers' focus group formed the elements of the repertory grid exercise. These were: Customer Information, Product Information, Competitor Information, Business Processes, Legal and Regulatory Information, Organisational Information, Supplier Information, Management Information, and People Management.

As can be seen from the rules for selecting elements and eliciting constructs outlined by Stewart et al. (1981), there are some problems with using these categories of information assets as elements in a grid. The first problem is that the categories are abstract. Each interviewee will have a different starting point because he/she will perceive the information assets in different ways. It can be argued, however, that the interviewees can perceive many of the information assets similarly. For example, with customer information, all of the executives would have been familiar with this information asset in their
respective organisations but, of course, they would all manage different customer bases. Similarly, they would all have competitors and product information assets, but their products and competitors would be different.

A greater difficulty is the requirement that elements should have a “good” and “bad” range, so that contrasts can be made between them. As the categories of information assets were basically generic types of information, none could really be seen as good or bad in its own right. The researcher endeavoured to elicit bipolar constructs by asking additional questions but, as can be seen from Exhibit 52 (Chapter 5), some opposites were described, for example, internal - external, and future - past.

It should also be noted that, although a combined grid of information attributes is presented in Exhibit 52, the repertory grid is not really a useful tool for comparison. It is an individual method and shows only the individual view of the participant. To use it for comparison between individuals is to deny Kelly's basic premise that all humans see things differently, resulting in unique and individual world views. However, some useful insights can be gained from making comparisons while recognising that the grid was not designed originally with this in mind. A combined grid of attributes of information as an asset was created (see Exhibit 52, Chapter 5) to show the range of attributes identified rather than to draw comparisons.

**Step 2 – Administering the grid**

The senior executives were given the revised set of nine categories of information assets as elements. They were told that these assets were commonly identified as being present in many organisations. It was noted that the assets are not always completely distinct from one another. The executives were initially sent Powerpoint slides which showed each category of information asset individually and provided some basic context for the assets. For example, customer information was shown to concern customer databases and organisational information assets were shown to include the
history and culture of the organisation. The participants were able to print these slides in note form and this saved time during the actual interview. The length of time taken to complete a repertory grid has been identified as a major drawback of this method, with a 20 by 10 matrix taking up to one and a half hours to complete (Easterby-Smith et al. 1991, pp. 84-87). It was clear also that the executives found it difficult to think of information assets in such a formal way and they subsequently reported that they felt challenged by the process but that it was “fun” overall.

Step 3 – Elicitation of constructs or attributes

The participants were given prepared sets of combinations of three categories of information assets, or triads, printed on 6” x 4” index cards. The cards had no additional contextual information, as this had been provided before the exercise, the aim being to encourage a focus on the elements themselves. Participants were then asked to identify two of the information assets in the triad which they considered similar and one information asset which they considered different. They were then asked to describe why the two they selected were similar and why the remaining one was different. Then a second set of five cards with the numbers one to five was presented and laid out in numerical order. The two assets identified as being similar were placed at number one and the one asset identified as being different was placed at five. Participants were then given cards specifying the six remaining categories of information assets and asked to position them in relation to the constructs, or attributes they had identified for the triad. This gave a result for all the nine categories of information assets in relation to the attributes proposed. The numbers one to five carry no inherent meaning but simply provided a way in which the executives could position the elements in relative terms.
Four triads were used:

123 Customer information, Competitor information, Product information.
456 Business processes, Management information, People management.
789 Supplier information, Legal and regulatory, Organisational information.
159 Customer information, Management information, Organisational information (This fourth triad was selected randomly by taking one card from each of the preceding categories).

With the nine categories of information assets, it would have been possible to present at least nine different triads of information assets. However, time constraints meant that only four triads were completed by each executive. This influenced the analysis of the grids: it was decided to combine the attributes elicited from the five participants in one grid which provided a richer picture of the range of attributes identified. Information assets were analysed separately for each executive.

Step 4 - Analysing the grid

There are five principal methods of analysis for repertory grid. These are:

- frequency counts;
- content analysis;
- visual focusing;
- cluster analysis; and,
- principal-components analysis.

The first two methods are concerned with analysing the content of the grid. Frequency counts simply count the number of times a construct or element is mentioned. Content analysis involves selecting a number of categories which the constructs or elements fit into and then assigning individual constructs and elements to them (Stewart et al. 1981, pp. 47-48). Content analysis is further defined by Bryman (2001, p.177) as “an approach to the analysis of documents and texts (which may be printed or visual) that seeks to quantify
content in terms of predetermined categories and in a systematic and replicable manner”.

The last three methods, visual focusing, cluster analysis and principal-components analysis, show not only the content but also the interrelationships between the constructs and the elements (Stewart et al. 1981, p.46).

Visual focusing is the basis of the more complex cluster analysis and principal-components analysis. It works by looking at one element first and noting down the pattern of numbers, in this case one to five, which have been assigned to it. These are then compared with the remaining elements and the number of agreements and disagreements is noted. The maximum score is the number of constructs in the grid. A picture can then be drawn up showing the agreement scores between every possible pair of elements. High numbers or matching scores indicate agreement between the elements, showing that they are perceived as having the same meanings by the interviewee.

The next stage of visual focusing is to re-sort the grid so that those elements with a high or similar score are placed close together. This is very difficult to do by eye and software packages have been developed which make this re-sorting or re-focusing relatively easy. What results is a picture of the elements, which places those in agreement together (Stewart et al. 1981). Cluster analysis, which has its basis in visual focusing, is the primary method used to analyse the senior executives’ information asset grids. Both cluster analysis and a general content analysis were used to analyse the senior executives’ combined attributes grid.

4.4.8 Software for analysis of repertory grids
The tool used to analyse the senior executives’ grids was WebGrid II. WebGrid II is a Web-based version of the repertory grid technique for building conceptual models (Gaines & Shaw 2001, p.2). The software is based on the concept of revealing the meanings in a grid by re-sorting it so that like elements are placed together and like constructs are placed together.
Information about WebGrid II can be found at:
http://tiger.cpsc.ucalgary.ca:1500/WebGridII.html

A later version of the software, WebGrid III,
http://tiger.cpsc.ucalgary.ca:1500/ is now available (Accessed 20th August 2004) and has replaced the WebGrid II version used for this analysis.

WebGrid III has improved graphics and analysis features but still performs the same basic functions of the previous version. WebGrid III is freely available for anyone to use and no permissions are required which makes it a useful tool for researchers. Data can also be stored in a “cache” provided by the programme so that access is easy. The drawback is a time limit of three months on the “cache” facility but this is more than adequate time for analysis. A data view of the software data entry area is shown in Exhibit 25.

Exhibit 25. Web Grid III data view
4.4.9 Conclusions on use of the repertory grid technique

The repertory grid method did succeed in identifying a range of attributes of information assets. It was clear that the attributes of information assets described by the senior executives were much wider than those identified from the literature. However, they were much too varied to be used in further research. Information attributes identified from the literature formed the basis of the case study work. Importantly, a strategic role for information assets in planning and control, managing internal and external operating environments, providing organisational direction and momentum in decision-making, was identified by the five senior executives. Attributes were described by the executives not only in terms of inherent properties of information assets such as quality but also in terms of information assets as valuable resources in themselves.
4.5 Interviews with six internationally-active information professionals

Six open-ended guided interviews with six senior internationally-active information professionals and academics sought to confirm that the issues addressed in this thesis were of relevance to a wider audience. The interviews focused on the relevance of information asset management and organisational performance to organisations and also asked for attributes of information assets to be identified. The interviews were conducted at the 4th Northumbria Conference on Performance Measurement in Library and Information Services held in Pittsburgh, Pennsylvania, USA, 12-14 August 2001.

The interviewees comprised:

- a senior academic from a New Zealand university;
- the Research Director of a USA university with many years' experience of research work in the library and information field;
- the Head of a UK-based Research School in the library and information science field;
- the Director of Information Services of a large UK-based specialist library;
- the University Librarian of a well-known USA university; and,
- the Executive Director of Information Services of an Australian university.

The open-ended guided interview approach is appropriate since these interviewees had many years' experience in their field and were expected to have strong opinions which could be best captured in a less structured interview format.
4.5.1 Recruiting participants
The senior academic, Research Director and the Head of the UK-based Research School are very well known in the information science field. They have all worked extensively in the performance measurement field where the value of information is a key if neglected issue. The Director of Information Services of the large UK-based specialist library and the University Librarian were selected because they were seen to have a stake in this research via their roles as librarians. The benefits which library and information services bring to organisations are often long-term (Abell 1994). Librarians face a constant challenge to communicate the value of their libraries and ultimately of themselves.

The Executive Director of Information Services was selected because of his interest in activity-based costing for libraries and information services on which he consulted worldwide. Activity-based costing differs from traditional cost accounting where costs are accumulated and controlled in total by cost category for each organisational unit. Under activity-based costing, costs are associated with what the organisation does (Brimson 1991, p.16). It was thought that the Executive Director of Information Services would have strong views on a value-oriented approach.

The six interviewees can all be seen as having differing perspectives due to their academic, research and practical management experience in libraries and information services. It should be noted, however, that these interviews were not intended to be representative. The aim was to seek the views of individuals who have many years’ experience in the information field; these views were of interest in exploring issues which impact on a wide variety of stakeholders including academics, researchers, students, business managers, consultants, information professionals, librarians and policymakers.

4.5.2 The interview process
All six interviewees were contacted by email prior to the conference and asked to participate in interviews, and all agreed. The interviews were conducted informally in the conference hotel lobby and meeting rooms. The
interviewees were supplied with the interview schedule (see Appendix-Interview schedules) well in advance and so had an opportunity to familiarise themselves with the issues to be addressed. Several of the interviewees also attended a conference presentation given by the researcher where the background, methods and early results of the repertory grid research were reported (Oppenheirn et al. 2002a). The interviews were tape recorded and later transcribed. The interviews lasted typically between 20 minutes and half an hour.

4.5.3 Interview themes
The seven themes addressed in the interviews were:

- Theme 1. The value of information and its measurement.
- Theme 2. The impact of the concepts of knowledge management and intellectual capital.
- Theme 3. The acquisition and use of information and the embedding of good practice.
- Theme 4. The relevance of these questions to other industry sectors. Are they more relevant issues for some sectors?
- Theme 5. Identification of attributes of information assets.
- Theme 6. Information assets and organisational effectiveness.
- Theme 7. Impact of identification and measurement of information assets on the perceptions of senior managers.

The themes progressed from general questions which addressed policy issues in the value of information, measurement and organisational learning fields to more specific questions that aimed to identify information assets, their attributes and the impact of their identification and measurement on the perceptions of senior managers. The seven themes covered in the schedule included general questions on ideological or practical approaches to information assets and their impact on organisational effectiveness. More specific questions which asked interviewees to identify attributes of a given set of information assets were also included. These information assets were
also those identified and revised using the information managers' focus group. Their applicability to a wider user group than already investigated with the five senior executives was of interest in developing the case study work.

The issues being investigated were both complex and controversial. Opposing views and conflicting approaches to the value of information assets mean there is little consensus in this area. The targeting of individuals with in-depth subject knowledge who were both independent and anonymous meant that diverse viewpoints could be explored. This approach has certain similarities to the Delphi technique, which structures group communication so as to focus on a complex problem through a series of iterations (Rowe 1999, p.354). The Delphi technique was developed during the 1950's by workers at the RAND Corporation while involved on a U.S. Air Force sponsored project. The technique is seen as a "procedure to obtain the most reliable consensus of opinion of a group of experts by a controlled opinion feedback" (Rowe 1999, p.354). Use of the technique involves controlled feedback to interviewees through which anonymous members of the group are informed of the opinions of their colleagues. This approach was not used with the six internationally-active information professionals, unfortunately, the conference setting of the interviews provided a one-off opportunity for meeting.

Information assets were defined for the interviewees as:

Information assets comprise resources that are or should be documented and which promise future economic benefits.

The interviews also provided a good opportunity to test the appropriateness of a concentration on a value-oriented rather than valuation approach to information assets (Theme 1). Focusing on the long-term future economic benefits of information assets sought to address issues arising from the literature which saw attempts to value information fail. The ways in which information added value to organisations was the area in which progress could probably best be made.
4.5.4 Conclusions on use of open-ended interviews with six internationally-active information professionals

The interviewees clarified many of the issues which the researcher was investigating and encouraged an open rather than limited view of information assets and their impact on organisational effectiveness. They also helped in the design of later case studies, highlighting the situational nature of information use and the importance of obtaining examples of information use in organisations. Although largely informal, the interviews were invaluable in providing assurance that the issues being addressed were of relevance to information professionals and academics who were expert in their field.
4.6 Case studies
Four case studies formed the central part of the research study and were undertaken between November 2001 and March 2002. The case studies comprised open-ended guided interviews with 45 senior managers and an information asset-scoring grid exercise which was used to familiarise the senior managers with a range of information assets and attributes.

4.6.1 Recruiting participants
The search for case study participants began in March 2001. A wide variety of approaches were used including re-contacting earlier interviewees, letters of invitation to named individuals in organisations targeted using a commercially available database, a call for participants in an international publication, *Information World Review* (October 2001) and contacting an interviewee identified from BBC business and financial television programming. The level of senior managers required to participate meant that there was an expectation that case study participants would be difficult to recruit and this proved to be well-founded.

Earlier interviews
The five senior executives who participated in repertory grid interviews were subsequently invited to participate in case studies. One executive felt he had already contributed what he could in the repertory grid interviews. A second appeared more promising but the sale and restructuring of his organisation meant that he could not commit to further research work. He did continue to have a role with the organisation. A third asked for the researcher to make a business case for participating in the case study and, while the researcher attempted this, it was clear that any business benefits were uncertain. No case studies resulted from this approach.

Commercially available database
The FAME (Financial Analysis Made Easy) database contains up to 10 years of detailed information for 500,000 UK companies plus summarised information for a further 1.7 million companies. This database was used to identify public limited companies and limited companies to invite to
participate in case studies. Companies were selected in the banking, insurance, consumer and technology sectors. Once identified, the currency of contact details and names of directors were checked using Key British Enterprises (2001). Over 200 organisations were contacted. This approach resulted in just one case study (Case study 1) which was the first to be carried out during November 2001.

Publicity
A news item (Jezzard 2001, p.3) calling for participants was published in the October 2001 issue of Information World Review (IWR). This resulted in a good number of enquiries about the research and two case studies resulted (Case studies 3 and 4). The news item also resulted in a contact from Susan Henzel, Manager, Education and Business Development, CAVAL Collaborative Solutions, Australia (http://www.caval.edu.au/). Ms Henzel is an internationally-recognised expert in the information audit field and has published a standard textbook in this area (Henzel 2001). She requested information on the methodology, aims and objectives of the research and offered her comments and assistance. An email dialogue was established between Ms Henzel and the researcher. A contact was also provided by Ms Henzel with Mr Ralph Godau who gave advice on the software package used for analysis of the case study data, ATLASTi.

BBC business and financial programming
A news interview on the BBC "Working Lunch" programme (http://news.bbc.co.uk/1/hi/programmes/working_lunch/default.stm) with the Managing Director of a Midlands-based manufacturing organisation provided the opportunity for the final case study (Case study 2). From the interview, it was clear that the Managing Director was extremely information aware and intent on building competitive advantage with information. A preliminary meeting was held with the Managing Director and agreement for conducting a case study was reached.
The four case study organisations recruited led to 45 senior managers being interviewed. The difficulty in recruiting interviewees may reflect an unwillingness to open up areas like information management to external scrutiny. Commercial confidentiality is a key problem. The numbers of senior managers interviewed for each case study were:

<table>
<thead>
<tr>
<th>Case study</th>
<th>Number of senior managers interviewed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
</tr>
</tbody>
</table>

Two of the organisations were based in the South of England (Case study 1 and Case study 4) and one in the Midlands (Case study 2). Case study 3 was based in East Anglia. With Case studies 2 and 4, the majority of interviews were conducted at head office but a small number of interviews were also conducted at one of the regional offices. Regional senior managers were far more critical of the organisations' information management than those located at head offices. A major concern of regional senior managers was access to information assets. Case study 3 was a public sector organisation whereas Case studies 1, 2, and 4 were public limited or limited companies.
4.6.2 Data collection and grounded theory

Creswell (1988, pp. 112-113) describes data collection methods within the grounded theory tradition and Exhibit 26 shows the corresponding activity adopted for this research study.

### Exhibit 26. Data collection methods within the grounded theory tradition

<table>
<thead>
<tr>
<th>Data collection activity</th>
<th>Grounded theory.</th>
<th>Activity adopted.</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is traditionally studied?</td>
<td>Multiple individuals who have responded to action or participated in a process about a central phenomenon.</td>
<td>Elites/Senior managers in information-intensive UK organisations.</td>
</tr>
<tr>
<td>What are typical access and rapport issues?</td>
<td>Locating a homogenous sample.</td>
<td>Level of interviewee difficult to access.</td>
</tr>
<tr>
<td>How does one select sites or individuals to study?</td>
<td>Finding a “theoretical sample”.</td>
<td>Personal contacts, business directories, media.</td>
</tr>
<tr>
<td>What type of information typically is collected?</td>
<td>Typically interviews with 20-30 people to achieve detail in the theory.</td>
<td>45 interviews with senior managers across four organisations.</td>
</tr>
<tr>
<td>How is information recorded?</td>
<td>Interview protocol, memoing.</td>
<td>Tape recorded.</td>
</tr>
<tr>
<td>What are the common data collection issues?</td>
<td>Interviewing issues e.g. logistics.</td>
<td>Time and financial constraints and quantity of data.</td>
</tr>
<tr>
<td>How is information stored?</td>
<td>Transcriptions, computer files.</td>
<td>Transcriptions, database, Excel files.</td>
</tr>
</tbody>
</table>
In addition to the data collected using the open-ended guided interviews an information asset-scoring grid was also developed. The information asset-scoring grid was used during the case study research to introduce senior managers to a range of information assets and attributes.

4.6.3 The information asset and attribute scoring grid

The grid was developed using a number of sources. These included a review of the literature. Burk and Horton's (1988) attribute categories were used to form the vertical rows of the grid while the information assets which formed the horizontal categories were based on the revised Hawley Committee identification of information assets (KPMG/IMPACT 1994). One small change was made to the information asset “Organisational Information”. The word “Culture” was added to provide immediate context for this asset.

The development of the information asset-scoring grid attributes row involved a compromise between the lack of context identified as an issue by the information managers’ discussion forum and the wider range of attributes identified during the repertory grid interviews with five senior executives. The repertory grid attributes were far too wide-ranging to be used in practice. A more detailed listing of attributes identified by Burk and Horton (1988, pp.91-99) together with an open category of “Other” provided the compromise. Senior managers could see that the attribute Quality was concerned with, for example, accuracy and relevance but they were also free to create their own attributes under the “Other” category. (Only two of the managers used the “Other” category).
The grid was primarily used to introduce senior managers to a range of attributes and assets and to help discriminate among them. The grid developed is shown in Exhibit 27.

Exhibit 27. Information asset and attribute scoring grid

The information asset and attribute scoring grid was designed to collect a large amount of data. An Excel spreadsheet was written to allow easy entry and access to this information and for ease of later analysis. The spreadsheet featured a white grid in the middle with Information Assets heading the columns and their attributes shown against the rows. Ratings were added, in the form of stars shown as Most significant (Gold), Next most significant (Silver) and Least significant (Blue). Blue was chosen as the bronze colour available was rather dark and unappealing. (Significance was used in an “importance” rather than statistical sense.)
The information asset-scoring grid as a new research tool

The information asset-scoring grid is a useful new research tool which was developed from the senior British information managers' scoring matrix and from the repertory grid exercise conducted with five senior executives. Information asset-scoring grid findings for each of the case study organisations are shown in Exhibits 55-58. A summary table of the most significant information asset and attributes generated for each of the case study organisation's, are given in Exhibit 59.

As mentioned earlier, the practical identification of attributes of information assets for use in the information asset-scoring grid was carried out in two phases. The first phase was carried out in January 2001 and involved a focus group of 27 senior British information managers. The information managers were presented with a range of information assets and attributes identified from the information science literature. They were asked to comment and to participate in scoring the attributes for each information asset. The expectation was that these senior British information managers would be familiar with a wide range of attributes and information assets and find the exercise straightforward. However, there was a great deal of difficulty encountered by the information managers' in the scoring of attributes against assets. They also regarded the Hawley information assets (KPMG/IMPACT 1994) as out of date and recommended their updating.

The second phase in the development of the information asset-scoring grid involved five interviews carried out with key senior executives in information-intensive UK organisations using a guided interview schedule and repertory grid technique. Five repertory grid exercises were conducted with the senior executives. They were given the senior British information managers' revised information assets in sets of three cards and asked to describe their attributes by selecting two, which were the same, and one, which was different. The major finding of the interviews was unsurprising, the executives took a "just in time" approach to the management of information assets. In the repertory grid exercises they identified attributes in terms of meeting business objectives, planning and control and decision-making. These findings led to the
development of the information asset scoring grid in a way which enabled participants to focus on a discrete set of information assets and attributes. By providing limitations to the range of information assets and attributes presented to the senior managers a focus was achieved which enabled wide-ranging discussion but also emphasised important information assets and attributes. This is an important feature of the information asset scoring grid and provides a unique focus.

The interviewees completed their own grids by adding stars to cells by simply selecting a cell and clicking on one of the three stars. Each case study organisation had its own sheets which contained the individual grids elicited from individual senior managers. The grids provided a good introduction to the concepts of information assets and their attributes. Some senior managers reported that they found it difficult to discriminate between attributes, arguing that different attributes became important for different information assets at different times. At the time, adding a situational dimension to the grid would have over-complicated the exercise. However, on reflection this would have added a useful context to the information asset-scoring grid and might be an area for future development. Further discussion of the importance of the development of the information asset-scoring grid and recommendations for future development will be made in Chapters 6, section 6.2.1 Findings of the information asset and attribute scoring grids and in Chapter 9, section 9.5 Conclusions regarding limitations of the research and of the research findings and suggestions for further research.

4.6.4 The case study process
The initial contacts and facilitators for Case studies 1 and 2 were their Managing Directors and for Case studies 3 and 4 their Information Managers. These contacts also nominated the interviewees. Interviews were scheduled over a three to four day period for each case study. Facilitators were supplied with a one page document outlining the purpose of the case study for distribution to their colleagues.
Background papers were made available so that participants could be familiarised with the issues to be addressed. Many of the interviewees read the background information supplied and offered comments during their interviews. Documents relating to the organisations' IT or ICT strategies were also obtained during the case study visits. Product brochures and marketing materials were also studied. The organisations' Internet and intranet sites were also of interest as repositories for large amounts of customer and employee information assets.

Confidentiality was of concern to the case study participants. Their main concern was the protection of commercially sensitive information. It should be noted that at least one of the non-routine decisions reported in Chapter 6 has been rephrased to ensure confidentiality. All of the case study organisations received a short report outlining the findings for their own organisations either on completion or shortly after the case study was conducted. This report identified senior managers by name and job title and was produced specifically as feedback for the facilitators to circulate. These reports are not included here for reasons of confidentiality.

The interviews took place either in the participants' own offices or in conference rooms allocated for interviews. An hour was allocated for the information asset-scoring grid and interview schedule. However, many of the interviews took up to two hours, with senior managers keen to talk about personal experiences with information management. The information asset-scoring grid was usually completed within the first five or ten minutes of the interview. Thus, the vast majority of time was occupied by the open-ended guided interview. Interviews were tape recorded and later transcribed. Interviewees were supplied by the facilitator with the interview schedule and a print out of the blank information asset and attribute scoring grid in advance so that they had time to consider the issues raised and to read the explanatory statements.
4.6.5 Developing the case study interview schedule

The development of the case study interview schedule (see Appendix-Interview schedules) was undertaken over nine months from January to September 2001 and reflected the results of the earlier repertory grid interviews with senior executives and the interviews with internationally-active information professionals.

The case studies focused on five major themes as shown in Exhibit 28. They are represented by bricks which together build understanding. Themes 1 and 2 are general areas of interest whilst Themes 3, 4 and 5 focus on specific issues, namely the identification, use and measurement of the effects of information assets.

1. The organisation and information strategy (O + IS).
2. The organisation and its effectiveness (O + E).
3. Identifying information assets (IIA).
4. Using information assets (UIA).
5. Measuring the effects of information assets (M).

Exhibit 28. Five major themes

- O + IS
- O + E
- IIA
- UIA
- M

Of these five major themes, two were formulated after analysis of the earlier interviews with senior executives and internationally-active information professionals. These were Theme 1: Organisation and information strategy and Theme 4: Using information assets. The repertory grid interviews with senior executives highlighted an over-emphasis on identification of information assets, their attributes and management. The lack of an overall strategic or business performance framework meant that the senior executives
interviewed felt that the over-arching role of information assets in their businesses was not highlighted. Their concerns were with overall strategy and business performance rather than individual information assets. Therefore, providing a strategic overview and context for managing information assets was necessary. This was achieved by basing Theme 1 Question 1 on the elements identified by Horton (1993, p.2) as necessary for strategic information management. The elements are:

1. “Information assets are major assets of the business and must be managed accordingly.
2. Information investments are made only in support of the business’s goals and objectives.
3. Senior managers and employees throughout the organisation are custodians of the information assets they use and, as such, they have a major responsibility, within corporate constraints, to use the information effectively and efficiently and to share it internally and externally.
4. End users are accountable for the planning, management and control of the information assets they collect or produce, process and store, deliver and use.
5. There is a formal management approach to the management of life cycle phases of information assets, beginning with creation and following through all the way to retirement and disposition.”

The five statements were reformed into seven independent statements which formed an additional question (Theme 1 Question 1) for the case study interviews (see Appendix-Interview schedules). Participants were asked to agree or disagree with the statements on a one to five scale where one represented Strongly agree and five represented Strongly disagree. They were told that the statements represented an ideal situation for information management in an organisation and were asked to position their organisation in relation to that ideal statement. Participants were asked to explain their ratings.
A second issue raised by the senior executives in the repertory grid interviews was the use of information assets within their organisations. Several of the executives argued that information assets were only useful when they served a particular business purpose. During the interviews with six internationally-active senior information professionals, a major reason for lack of investment in information management was identified as the situational nature of information use. Therefore, identifying particular situations and examples within which users identified, collected and applied information assets was necessary. Decision-making and, in particular, non-routine decision-making provided a vehicle for the exploration of information assets and attributes used by senior managers in specific contexts and for specific purposes. This formed the basis of a new theme for the case studies: Theme 4, Using information assets. The perception of senior managers as to the increasing or decreasing value of the information assets used for decision-making was also of relevance to this theme.

Although the literature shows that the value of information assets is subjective and context dependent, some specific questions on the value of information assets to organisations, such as level of investment and replacement cost, were included to highlight possible approaches to the management of information assets. As outlined in Chapter 2, the valuation of information is an extremely difficult issue owing to the dynamic nature of information assets and their unreliability in financial terms. Measuring attributes of information assets such as Quality or Utility can give some indication of the future economic benefits of the assets in terms of maintenance and accessibility. Its greatest benefits, however, may be in helping senior managers to visualise abstract concepts such as information assets and attributes within an evaluative framework.
4.6.6 Approaches to analysis of case study data

Information asset-scoring grid

The information asset-scoring grid was used to provide a simple visual representation of assets and attributes using Excel charts. Charts for individual senior managers were produced. A simple visual count of gold stars (yellow bars) were taken to show the most significant assets and attributes scored. Information asset-scoring grid findings for each of the case study organisations are shown in Exhibits 55-58. A summary table of the most significant information asset and attributes generated for each of the case study organisation's, are given in Exhibit 59.

Open-ended guided interviews

Analysis was conducted using a grounded theory approach. Strauss and Corbin (1990, p.10) define the grounded theory approach as:

"a qualitative research method that uses a systematic set of procedures to develop an inductively derived grounded theory about a phenomenon" (Strauss & Corbin 1990, p.26).

Two levels of analysis were employed: qualitative using a specialist qualitative data analysis (QDA) software package and quantitative using Excel.

Excel analysis

Questions such as "Do information assets feature on the management agenda?" were analysed using Excel to give a simple count of Yes, No and Do not know answers. Exhibit 29 shows a view of the Excel data. The job title of the senior managers interviewed, case study number and coding for Theme 1 Question 1 are also shown.
Theme 1 Question 1 comprised seven statements based on the five guiding principles of strategic information management suggested by Horton (1993, p.2). This theme was suitable for analysis at either qualitative, quantitative or both levels as supporting statements were made to provide context for the numeric ratings given. The key factor in deciding which level of analysis to use was that the supporting statements were of more interest. It was decided to focus on the statements made although initial analysis was performed using Excel to give prompt feedback to case study facilitators. A central view of the data from Theme 1 was created using a Qualitative Data Analysis package (see Exhibits 64-67).

4.6.7 Selection of QDA (Qualitative Data Analysis) software
The QDA package selected for the analysis of the interview data was ATLAS/Ti. ATLAS/Ti is an acronym which stands for “Archiv fuer Technik, Lebenswelt und Alttagssprache” translated as “archive for technology, the life world and everyday language”. The extension “Ti” stands for text interpretation. It was developed by Project ATLAS (1989-1992) – Technical University of Berlin and is based in grounded theory.
The other well known QDA package which was considered for use was NUD*IST (version 4). NUD*IST uses trees to structure concepts in an index but lacks the conceptual graphs which ATLAS/Ti offers. NUD*IST does have benefits in that it imposes a hierarchy so that specific concepts can become subsets of a number of more general ones. However, a major drawback of the package is the lack of a printing facility for code trees (This drawback has been addressed by a new version of the software (version 5). A comparison of the features of ATLAS/Ti and NUD*IST is shown in Exhibit 30.

Exhibit 30. Comparison of ATLAS/Ti and NUD*IST (Barry 1998, p.8)

<table>
<thead>
<tr>
<th>ATLAS/Ti</th>
<th>NUD*IST</th>
</tr>
</thead>
<tbody>
<tr>
<td>User-friendly interface</td>
<td>Less developed interface</td>
</tr>
<tr>
<td>Hypertext links between data, codes and documents</td>
<td>Fewer links between data, codes and documents</td>
</tr>
<tr>
<td>No limits on coding</td>
<td>Coding has to be decided in advance and used throughout</td>
</tr>
<tr>
<td>Networks can be printed/exported</td>
<td>No option to print tree display of codes</td>
</tr>
<tr>
<td>Creative/visual – but unstructured</td>
<td>Hierarchical – limited</td>
</tr>
</tbody>
</table>

Getting started with analysis using ATLAS/Ti is relatively easy. The package is accessible and flexible, if somewhat slow, and prone to falling over at intervals. NUD*IST on the other hand is less accessible and flexible making it much slower to get started. The researcher had the benefit of access to an ATLAS/Ti practitioner, Mr Ralph Godau, through a contact known to Ms Henczel, Manager, CAVAL Collaborative Solutions which also influenced the choice of software.
Loading and organising the case study interview data
A project file, termed a Hermeneutic Unit (HU) in the ATLAS/Ti programme, was created. This was used to store the interview files associated with the case studies. The file was named Case study 4.hpr. Exhibit 31 shows a screenshot of the HU with the transcript of the interview with Lead Consultant 2 displayed. The coding area is shown in the margin to the right.

Exhibit 31. Screenshot of ATLAS/Ti showing user-friendly interface (Lead Consultant 2- Case study 1)
As mentioned earlier, one of the benefits of the ATLAS/Ti programme is a very user-friendly interface. It is set out in attractive yellow and grey colours which are easy to see. The interface is intuitive and it has many functions in common with Microsoft Windows, including drop down menus, buttons with illustrated icons and a drag and drop facility. There are four major data storage and display areas named Combo boxes. The four Combo boxes are: documents, quotations, codes, and memos.

The **Documents Combo box** provides a listing of all the documents (sound and video files can also be stored) that have been assigned to the HU. It is easy to scroll through different documents, moving easily within documents themselves and through the listing of all documents.

The **Quotation Combo box** provides a listing of all the quotations that have been coded. Quotations appear with a Document number and a line number to the front of the quotation so that it is possible to see quickly from a standalone list of quotations from which documents and at which point in an interview they have appeared. For example, the following quotation is from Document 1 and appears at line 27:

1:27 “There is I think very crude methods. For example, in my group, I don't know whether this is relevant, we take stock, we say we've called 250 clients this week, we've got 10 requests for further information, we've got 5 meetings set up and the possibility of some work with one of them.” Lead Consultant 1 – Case study 1.

The **Code Combo box** stores the codes assigned. Codes can be associated with text or can be created freely. Free coding allows codes to be created that are not associated with any text. Free codes that are not associated with any text are shown with an associated number 0-0. Free codes associated with one text are shown by 1-0 and so on. As the number of associations with text builds up, the code starts to take on a level of groundedness in the data. The second part of the associated number 1-0 refers to its degree. This is the number of relationships between the code and other codes so that one
relationship would be shown as 1-1. This is the level of density of the code in the data, the number of important relationships and linkages with other codes.

Open coding is another useful feature of the coding process. Open coding can provide an initial label for a piece of text which can then be developed into a more meaningful concept as the analysis progresses. It is also useful to segment and organise text. For example, an open code called “Information strategy” was created which could then be used to export all the text related to Theme 1 The organisation and information strategy. This allowed replies from interviewees for each theme to be brought together easily.

Codes and associated text and are linked by extensive hyperlinks. For example, doubleclicking on a code will bring up the quotation associated with that code highlighted within the primary document. This helps to keep the researcher in close contact with the data. It is always easy to check where codes have originated. In addition, Comments can also be added to codes using yellow comment boxes giving an added dimension which helps to remind the coder why a particular code was chosen as appropriate. As distance emerges between the data and the code, comments become a reminder of context and meaning. A more extensive use of the comment facility for this research would perhaps have saved time in terms of duplication of codes which had to be merged at the end of the coding stage.

The Memo Combo box provides an opportunity for linking thoughts about codes, quotations and networks (networks are described in section 4.6.8) to create emerging themes which provide the basis for theory building. Memos provide unlimited room for writing text, or theory building and can be exported to Word. The output features of ATLAS/Ti provide limited formatting functions for exported text however. Text is outputted in Courier 10 and then has to be reformatted in Word. This proved a lengthy task as a large number of quotations have been used to illustrate the thesis.
Storage of interview transcriptions

Transcriptions of the 45 interviews were assigned as “primary documents” to the HU. Once a document has been assigned it is linked with the HU but not stored within it. Instead documents are stored within a TEXTBANK which is located on the hard drive. The HU stores all of the objects (termed nodes) associated with a document, e.g. codes, quotations, networks and memos but not the text of the document itself. This is only accessed when the HU is opened. It is easy to forget that the TEXTBANK is a separate entity, especially when moving files to a new computer. It may appear that all of the primary documents have disappeared. However, relinking them is relatively easy but rather hidden under a Miscellaneous drop down label. Here the path to the primary document can be changed to the new location using a simple browse function.

Search and retrieval

Use was made of the search and filter facilities provided by ATLAS/Ti to organise the data. By coding themes, for example, Non-routine decision, and then retrieving all the quotations associated with that code, answers for one theme across all the participants could be brought together. Filtering quotations by code was also used to output quotations associated with a particular code, giving a list of quotations by code.

ATLAS/Ti is based in grounded theory but can be used for any analysis. It can be difficult to discern the grounded theory process once immersed in the programme. Section 4.6.8 attempts to show the grounded theory process as reflected in the programme functions.
4.6.8 Grounded theory and ATLAS/Ti

The seven steps of a grounded theory analysis and their reflection in the software package, ATLAS/Ti, are summarised in Exhibit 32.

Exhibit 32. Grounded theory process and reflection of steps in ATLAS/Ti

<table>
<thead>
<tr>
<th>Steps (Easterby-Smith et al. 1991, pp.108-112)</th>
<th>ATLAS/Ti</th>
</tr>
</thead>
<tbody>
<tr>
<td>Familiarisation</td>
<td>Coding</td>
</tr>
<tr>
<td>Reflection</td>
<td>Literature review (not covered adequately by software but memos can be used to help note interesting questions arising from the literature)</td>
</tr>
<tr>
<td>Conceptualisation</td>
<td>Category building</td>
</tr>
<tr>
<td>Cataloguing concepts</td>
<td>Automated</td>
</tr>
<tr>
<td>Recoding</td>
<td>Merging and renaming</td>
</tr>
<tr>
<td>Linking</td>
<td>Networks</td>
</tr>
<tr>
<td>Re-evaluation</td>
<td>Theory generation/memoing</td>
</tr>
</tbody>
</table>

Analysis using a grounded theory approach involves the assignment of concepts and themes (codes) to interview data. The coding is performed on words, sentences and paragraphs.

**Familiarisation/Coding**

The first step is free and open coding, which involves the first coding of concepts and themes (see Exhibit 32). This stage was primarily used to organise the data and to initially code concepts and can be seen as the Familiarisation step in the grounded theory process. Open coding was also used to code Yes/No and Do Not Know answers providing a simple output of numbers of occurrences which could be checked with the Excel count. This double counting increased the reliability of the data. Once the initial coding has been performed it is important to review codes and merge or rename codes that have been duplicated or which have very similar meanings. This is the Recoding step in Grounded theory. For example, both the words Accurate and
Accuracy were coded in different documents as attributes of information assets. These codes were merged to form a single code Accuracy. The software retains a record of the merged code in a comment box linked to the new or over-riding code.

Reflection/Memoing

The second step of the grounded theory process, Reflection, is not adequately covered by ATLAS/Ti but can be approximated by re-reading literature and noting important issues as memos. Importantly, there is an opportunity to create memos at any stage of the analysis so that ideas and important breakthroughs can be written down and revisited as the analysis progresses. Memos provide the opportunity for theory building with unlimited text space.

Conceptualisation/Category Building and Axial coding

The conceptualisation step of grounded theory is mirrored by the building of categories in ATLAS/Ti. The first step in this process involves placing each issue in context so that its causes and results can be related. This is the most time-consuming stage of the coding as it requires extensive mapping of relationships across themes and concepts. This building of relationships and linkages is termed Axial coding in ATLAS/Ti and is located within the Network function. Networks are basically conceptual graphs which help to explore ideas using intuitive graphical representations. They provide a visual representation of the data which helps to reduce cognitive load when handling complex relationships.

Linking/Networks

Networks consist of nodes (nodes can be codes, memos or quotations) and are connected by arcs which can be directed or undirected. Codes are the most commonly used form (http://www.atlasti.com/glossconcepts.shtml). Focused networks can be generated very easily from codes with associated text (by importing an object and its neighbours) or can be independently created by importing into a blank network. Arcs can be given one of a built-in set of relation names such as “causes” (Richards & Richards 1994, p.459). These relations are role indicators for concepts and can be seen in Exhibit 33.
In Exhibit 33, a broken leg is shown as the cause of pain. (The broken leg could also be shown as the consequence.) Its properties are multiple fractures, sensation present and a fall on an icy street. Strategies employed to deal with the issue of pain are: taking pills, reading a book and placing a splint on the leg. The consequence of these strategies is temporary relief. The contexts in which this occurs involve obtaining prompt help and a visit to hospital. The intervening condition, the untrained first aider, shows the different unexpected conditions, such as an untrained first aider, that impacted on the issue of pain.
Some default relations are pre-loaded at start up of ATLAS/Ti, for example:

\(<\text{isa}\)> Links specific concepts to general concepts – Dog \(<\text{isa}\>\) Mammal
\(<\text{is-cause-of}\)> Links cause and effect - Broken leg \(<\text{is-cause-of}\>\) Pain

These can be supplemented by user-defined relations as in Exhibit 33, where "strategy" is a user-defined relation. The default relations are useful for building networks that represent situations rather than the abstract concepts that are the focus of this research. As a result, user-defined relations were created to represent linkages in the data.

Nine user-defined relations were created as follows:

- Asset - An information asset.
- Attribute - A characteristic of a concept or of an information asset.
- Context - To signify the conditions in which the issue is raised.
- Determine - The impact of one factor on another.
- Feedback - The suggestion made by an interviewee for addressing the issue raised.
- Issue - The concept/problem under investigation.
- Part - A partial connection between concepts and sub-concepts.
- Relate - A relationship between concepts.
- Result - The outcome of the issue raised.

ATLAS/Ti creates an output list of all codes in order of groundedness and density. This focuses attention on those codes that have a high level of "groundedness", i.e., where the concept frequently recurs and those that have a high level of "density", i.e., where there are important relationships between codes, or both. Where codes have a groundedness of over 20 and a density of over 10 they can be said to be important and can be used to create categories for theory building\(^1\). As concepts are coded and linkages are made between them, frequently coded and linked concepts begin to show high levels of

\(^1\) Ralph Godau email to J.A. Stenson, August 2002.
groundedness and density. Concepts that have a high occurrence in the text, i.e. a high first number (20-0), have groundedness. A high number of linkages with other concepts, i.e. a high second number (0-20) have density. Concepts that have both a high level of groundedness and density (20-20) can be identified as important and used for further analysis.

Re-evaluation/Selective coding
The final stage is “selective coding” which involves the integration of the categorised material into a theory (see Exhibit 34). This integration is achieved by selecting a category as a “core category” around which the rest of the categories can be organised. Memo writing helps to provide insights into the theory as the grounded theory process and coding stages come together.

Exhibit 34. The grounded theory process and coding stages

![Diagram of the grounded theory process and coding stages]

The theory can then be modelled to provide a visual representation of the theory generated.

4.6.9 Issues surrounding use of Excel and ATLAS/Ti
The use of Excel and ATLAS/Ti did cause difficulties in duplication of work and this has been discussed in Chapter 3. Employing two levels of analysis means that it is difficult to ensure that relationships are preserved between the two levels so that the data can be compared as input. This difficulty was addressed by producing a number of broad codes in the primary coding stage in ATLAS/Ti which structured the data around the themes addressed. Within these broad codes, Yes, No and Do not know answers were coded as well as High, Medium and Low, and More, Less and Unchanged answers.
For example, for Theme 2 Question 3 (a) Is your organisation effective?, Yes, No and Do not know answers were coded in Excel using 0, 1 and 2 codes with corresponding Yes, No and Do not know codes in ATLAS/Ti. These could then be matched to ensure consistency in numbers of positive or negative answers and so enable basic comparison. The double coding was time consuming and perhaps could have been avoided with a more focused interview schedule. The approach to recoding Excel data in ATLAS/Ti was also unsatisfactory since such codes appear very out of place amongst more meaningful concepts. As coding progresses, retaining individual codes becomes secondary to creating larger categories which aid theory building.

It is also a characteristic of the QDA selected, ATLAS/Ti, that it is useful in building relationships between a number of topics which have some major characteristics in common (Richards & Richards 1994, p. 460). It is not suited to counting numbers of occurrences or description. It encourages a deep understanding of the interview data since the number of codes and the number of relationships between them is always clearly displayed. However, the use of open codes to organise the data and to code quantitative answers does provide a way to link qualitative and quantitative answers.

On reflection, it would have been much easier to have collected and analysed only one type of data. However, the reliability of the data and its quality were enhanced by the use of both qualitative and quantitative questions. Quantitative questions also provided useful jumping off points for discussion with interviewees. A more serious criticism is the subjective nature of the interview questions. The research topic addressed necessitated a more individualistic approach as views of information value are essentially subjective as identified in the literature. Exploring the views of senior managers with experience of, and an interest in, managing information assets in their organisations meant that addressing subjective views was a valid approach.
4.6.10 Conclusions on the use of case studies

The data collection methods employed, subjects, data collected and analysis approach are shown in Exhibit 35.

Exhibit 35. Case study summary table

<table>
<thead>
<tr>
<th>Data collection method</th>
<th>Subjects</th>
<th>Data collected</th>
<th>Analysis approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information asset scoring grid</td>
<td>45 senior managers</td>
<td>Information asset-scoring grid charts</td>
<td>Excel</td>
</tr>
<tr>
<td>Open-ended guided interviews</td>
<td>45 senior managers</td>
<td>Interviews</td>
<td>Excel and ATLAS/Ti</td>
</tr>
</tbody>
</table>

The case studies conducted involved two major stages of data collection:

- An information asset-scoring grid was used to introduce senior managers to a range of information assets and attributes.
- Open-ended guided interviews conducted with 45 senior managers collected rich qualitative data.

The case study method itself provided an opportunity to discuss issues concerning senior managers and information within the setting of their own organisations. The method provided access to a range of views so that a deeper understanding of the issues could be gained. Case studies also provided an opportunity to gather contextual background information to the issues raised by the interviewees since the researcher was on site for several days and had access to company intranets, sales and marketing information, company websites and electronic libraries. This provided a much more detailed picture of the organisations and their members so that the issues raised by interviewees could be placed in context.
4.7 Summary

This chapter detailed the data gathering strategies adopted to meet the aims and objectives of the research. Data gathering was extensive and was conducted over a period of time. The major data collection method was the open-ended interview, focusing on elite groups of senior executives, information professionals and senior managers. Two main data collection stages were described: Data collection for Preliminary Research and Data collection for Case studies.

Data collection for Preliminary Research comprised:

- A focus group with 27 senior British information managers.
- Repertory grid exercise and open-ended guided interviews with five senior executives.
- Open-ended guided interviews with six internationally-active information professionals.

Data collection for the Case studies comprised:

- Information asset and attribute scoring grid.
- Open-ended guided interviews with 45 senior managers in four case study organisations.

Strategies for analysis of the data collected were also described. The use of software for the analysis of repertory grids, WebGrid II and software for the analysis of qualitative interview data ATLAS/Ti were detailed. The analysis process was described and a comparison drawn between the use of grounded theory and the use of qualitative data analysis software.
4.8 Conclusion
The preliminary research data collected helped to clarify important issues in
the research study (for example, the usefulness of a value added rather than
valuation approach to information assets). It also helped to pilot the case
study questions and suggestions for new areas to be included in the case study
work were made. The information asset scoring matrix presented to the
information managers' focus group and the repertory grid exercise completed
by five senior executives helped in the development of the information asset
and attribute scoring grid used in the case study work. The grid proved a very
useful method for introducing senior managers to a range of information assets
and attributes and is an important new research tool.

Open-ended guided interviews with 45 senior managers conducted as part of
the case study research provided a wealth of qualitative data. The data
collection took place over a lengthy period of time. However, the level of
interviewee targeted and the specialist nature of the subject area ensure that
the data collected is relevant. Difficulties with analysis using both qualitative
and quantitative methods were also encountered and strategies were developed
to deal with them. The data collection phase of the research could perhaps
have benefited from a more structured approach. However, the data collected
was substantial and from a high level of interviewee.
CHAPTER 5

5. FINDINGS OF PRELIMINARY RESEARCH

In this chapter, findings of the preliminary research are described. A short introduction, Section 5.1, is followed by Section 5.2 which presents the lessons learned from the information managers' focus group. Section 5.3 presents the findings of open-ended guided interviews and repertory grid interviews with five senior executives. Section 5.4 presents findings of six interviews with internationally-active information professionals. The chapter closes with a summary of the preliminary research findings, Section 5.5, and with conclusions on their importance.

5.1 Introduction

The preliminary research comprised: a senior British information managers' focus group, open-ended guided interviews and repertory grid exercises with five senior executives and interviews with six internationally-active information professionals. The aim of the preliminary research was to define and clarify the research aims and objectives and to tentatively explore some of the more difficult areas addressed by the research study such as the value of information assets.

5.2 Findings of the senior British information managers' focus group

As outlined in Chapter 4, the senior British information managers' discussion forum made recommendations concerning updating the Hawley Committee (KPMG/IMPACT 1994) categorisation of information assets and attributes of information assets identified from the literature. It also discussed a scoring system for attributes of information assets based on an Olympic gold, silver and bronze system as an antidote to the more traditional numeric rankings employed by Burk & Horton (1988).
5.2.1 Senior British information managers’ recommendations concerning updating of Hawley Committee’s (KPMG/IMPACT 1994) categorisation of information assets

The recommendations from the information managers’ discussion group were as follows:

**Specialist knowledge:** This term was considered confusing and out of place – especially as it brought all of the requirements to identify and define “knowledge” within the research process. While recognising the importance of “knowledge” it was felt that concentration on types of information or information assets would provide a firmer foundation for later work.

**Accounting information:** This term was not understood by the information managers as referring to legal information, (for example, health and safety information in legal cases). This was identified as one of the most important information assets, one often only identified under pressure of legal action. Renaming the asset as **Legal and Regulatory** was recommended.

**Human resource information:** This was regarded by the information managers as an outdated term. The argument was that “people are not resources for an organisation; they are, of course, people”. The term **People management** was recommended instead.
Organisational information: This asset was suggested as an important information type. It was not included in the Hawley Report (KPMG/IMPACT 1994), but now is increasingly recognised by organisations as being essential to organisational learning and change management. Orna (1999, p.131) highlights the importance of organisations having an inward focus on culture which can have both a positive and negative impact:

“Organisations must be aware of the features of their organisational culture that they most value... and look at those features that make a negative contribution to corporate well-being” (Orna 1999, p.131).

Organisational information was adopted as an additional information asset for use in the case study work and the term “Organisational information” was further clarified by the addition of the word “culture”. This term was used in the guided interviews with six internationally-active information professionals and subsequently in the development of the information asset-scoring grid. Thus Organisational information “culture” became a separate category of information asset.

Of the remaining information assets, Business process information provided the most debate. Some participants argued that business process information should not be regarded as an information asset at all. Others pointed out that organisations like Cisco, the American technology giant, were packaging and selling their business processes, making such information a financial asset. The arguments for including business processes among information assets outweighed the arguments against. The revised information assets are shown in Exhibit 36.
5.2.2 Senior British information managers’ recommendations concerning currency of attributes of information assets identified from the literature

The information managers’ discussion forum argued that the attributes of information assets presented to them from the literature (shareable, expandable, current, accurate and sufficient) were limiting and, more importantly, open to a wide variety of interpretations. They also raised the question of whether these types of attributes were relevant to today’s senior managers. This highlighted a need to ensure that the attributes of information assets identified from the literature were going to be relevant to the senior managers to be interviewed. A mechanism for identifying attributes of information assets independent of any prompting from the interviewer would be needed to gauge whether attributes identified from the literature were relevant. It was also interesting to see whether new attributes might emerge. This identification exercise was conducted using repertory grid technique and was accompanied by open-ended guided interviews.

5.2.3 Senior British information managers’ recommendations concerning scoring attributes of information assets

The information asset and attributes matrix presented (see Exhibit 24) suggested a numeric scoring system. The system assigned a one to five score for each attribute as related to each information asset. A score of one would mean this is a minor attribute, whilst a score of five would mean this is a crucial attribute of that particular asset. The information managers’ discussion forum pointed out that the temptation to add these scores up meant that an
attribute which scored one for many information assets would be rated more highly than one that scored five (and was therefore essential) for just one information asset. A more visual system involving scoring by the Olympic gold, silver, bronze categories and even tin was suggested. The benefits of such a system were that it could be easily understood by all managers and so encouraged the visualisation of a varied collection of information assets and attributes. These suggestions were used in designing the information asset-scoring grid used in the case study work.

5.2.4 Summary of findings from senior British information managers’ focus group
The information managers’ focus group revised and updated the Hawley Committee (KPMG/IMPACT 1994) categorisation of information assets. It also suggested updating attributes of information assets identified from the literature and that these attributes required testing to ascertain their relevance to today’s senior managers. The scoring of information assets and attributes was also discussed by the focus group and highlighted the need to ensure that those essential information assets and attributes for business performance were not inadvertently hidden using numeric scoring techniques. The senior British information managers’ discussion forum provided an excellent starting point for the research and ensured its relevance for practitioners.
5.3 **Open-ended guided interviews with five senior executives**

5.3.1 **Interview themes**

Five major themes were covered in the open-ended guided interviews. (Full interview schedule can be seen in Appendix-Interview schedules). The interviews were exploratory and aimed to raise issues of importance to the management of information as an asset. They also acted as a pilot for interview questions to be used in the case study interviews.

- Who is responsible for managing information assets in your organisation?
- What is the role of information assets in your organisation?
- Have you identified any or all of the information assets you consider significant?
- What mechanisms are used for identifying and managing information assets?
- What problems are perceived in identifying information assets?
5.3.2 Findings of open-ended guided interviews with five senior executives

Theme 1: Who is responsible for managing information assets in your organisation?

This question was framed in two parts. Part one sought to identify where ultimate responsibility for managing information assets resided, as perceived by the senior executives. Part two sought to identify who was responsible for actively managing information assets in the organisation.

Exhibit 37. Theme 1, Part one: Ultimate responsibility for managing information assets

<table>
<thead>
<tr>
<th>Finance Director</th>
<th>Chief Executive.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company A</td>
<td></td>
</tr>
<tr>
<td>Director of Strategic Planning</td>
<td>Chief Executive &amp; Department Heads.</td>
</tr>
<tr>
<td>Company B</td>
<td></td>
</tr>
<tr>
<td>Head of KM</td>
<td>Department Heads.</td>
</tr>
<tr>
<td>Company C</td>
<td></td>
</tr>
<tr>
<td>Chairman</td>
<td>Everyone is responsible.</td>
</tr>
<tr>
<td>Company D</td>
<td></td>
</tr>
<tr>
<td>Finance Director</td>
<td>Board of Directors ultimately but mainly Executive Management Team.</td>
</tr>
<tr>
<td>Company E</td>
<td></td>
</tr>
</tbody>
</table>

As can be seen from Exhibit 37, ultimate responsibility for the management of information assets was seen to reside with the Board of Directors or Chief Executive by participants A, B, and E as this is where ultimate responsibility for the whole organisation resides. Responsibility was also seen to reside with employees and with individual Department Heads by those in B, C, and D which may show a more "bottom up" approach to the management of information assets in those companies. This is in contrast to the Hawley Committee (KPMG/IMPACT 1994) recommendation that information assets should be the responsibility of Boards of Directors.
Exhibit 38. Theme 1, Part two: Who is involved in actively managing the information assets in your organisation?

| Finance Director Company A | Finance Director, Company Secretary, Chief Executive. |
| Director of Strategic Planning Company B | Department Head, Project Head. Everyone is responsible for managing own information. |
| Head of KM Company C | Departmental Group Head, Information Manager, Vice President of Licensing. |
| Chairman Company D | Everyone is. |
| Finance Director Company E | Everyone: including management at various levels, for example, project information is managed by the Project Manager. |

From Exhibit 38, we can see that a devolved approach in the active management of information assets is apparent in participants B, D, and E. For Finance Director, Company A, and Head of Knowledge Management, Company C, the active management of information is seen as the role of senior executives, while the Finance Director of Company E has a task oriented approach. Participants A, B, C, and E also described the active management of information assets using specific job titles, for example, Finance Director, Information Manager and Project Manager.

Theme 2: What is the role of information assets in your organisation?

Participants were presented with a range of organisational activities, which addressed both strategic and operational areas of business. They were then asked to score on a one to five scale the importance of information assets for each activity. These activities are listed in Exhibit 39. The executives could also add any other activity, which might be important for their particular organisation.
Exhibit 39. List of organisational activities

- Achieving control
- Cost savings/Enhancing efficiency/productivity
- Enhancing effectiveness
- Research and development
- Operational management
- Customer service
- Competitive intelligence
- Staff management
- Strategic management
- Other – please specify

The total scores are summarised in Exhibit 40 and were high, showing that the interviewees thought information assets were important for this wide range of organisational activities. (The maximum possible score was 50).

Exhibit 40. Theme 2. Total scores

<table>
<thead>
<tr>
<th>Position</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finance Director, Company A</td>
<td>43</td>
</tr>
<tr>
<td>Director of Strategic Planning, Company B</td>
<td>42</td>
</tr>
<tr>
<td>Head of KM, Company C</td>
<td>42</td>
</tr>
<tr>
<td>Chairman, Company D</td>
<td>36</td>
</tr>
<tr>
<td>Finance Director, Company E</td>
<td>38</td>
</tr>
</tbody>
</table>
Individual executive’s scores by organisational activity are shown in Exhibit 41.

Exhibit 41. Theme 2. Summary of individual scores by activity

<table>
<thead>
<tr>
<th>The following organisational activities are dependent on related information assets</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Achieving Control</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>22</td>
</tr>
<tr>
<td>b. Cost savings/Enhancing efficiency/productivity</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>22</td>
</tr>
<tr>
<td>c. Enhancing Effectiveness</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>19</td>
</tr>
<tr>
<td>d. Research and Development</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>e. Operational Management</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>22</td>
</tr>
<tr>
<td>f. Customer services</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>22</td>
</tr>
<tr>
<td>g. Competitive intelligence</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>22</td>
</tr>
<tr>
<td>h. Staff Management</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>22</td>
</tr>
<tr>
<td>i. Strategic management</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>j. Other – please specify</td>
<td>0</td>
<td>0</td>
<td>5*</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

1 = Strongly Disagree, 2 = Disagree, 3 = Neither disagree nor agree, 4 = Agree, 5 = Strongly Agree.* Brands

As can be seen from Exhibit 41, both Finance Director, Company A and Director of Strategic Planning, Company B, scored all of the organisational activities at 4 or 5 resulting in the highest scores. Head of Knowledge Management, Company C identified Brands as an “archetypal information asset” and added brand management as an organisational activity in the “Other” category, scoring this as a 5. This raised Head of Knowledge Management, Company C’s score to 42 from 37. Both Chairman, Company C, and Finance Director, Company E gave more varied scores, but again these were in the high range. Interestingly, research and development was consistently scored 5 by all the interviewees.

Both Finance Director, Company A, and Head of Knowledge Management, Company C, regarded the activities listed as too broad. For example, Finance Director, Company A divided operational management into two aspects, Safety and Environment, both of which were major concerns of his organisation. The Chairman of Company D identified enhancing effectiveness as the most difficult activity to score.
Theme 3: Have you identified any or all of the information assets you consider significant?

The five senior executives were asked to describe specific information assets they had identified and why they considered them to be significant:

Finance Director, Company A

The Finance Director of Company A, as can be seen in Exhibit 42, identified a wide range of information assets and linked them to strategic and operational objectives. Relationship and partner information assets were seen as being very important: the company had partnerships with about 80 other organisations.

Exhibit 42. Finance Director, Company A

<table>
<thead>
<tr>
<th>Information asset identified</th>
<th>Significance of the information asset:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial information.</td>
<td>Commercial success dependent on financial control and direction.</td>
</tr>
<tr>
<td>Customer profiles.</td>
<td>Allows strong growth.</td>
</tr>
<tr>
<td>Industry regulations.</td>
<td>Need to comply with legal responsibilities.</td>
</tr>
<tr>
<td>Partner information.</td>
<td>Dependent on partners to ensure operational effectiveness.</td>
</tr>
<tr>
<td>Relationship information.</td>
<td>Maintaining good relationships with suppliers and customers is essential for the business.</td>
</tr>
<tr>
<td>Staff/Employee information.</td>
<td>Need good job fit for employees and need to know their needs.</td>
</tr>
</tbody>
</table>
The Director of Strategic Planning of Company B, as shown in Exhibit 43, reported that the organisation had identified some information assets but pointed out that this did not necessarily mean they had captured them. Information for innovation was recognised as being very significant but was seen as being "too difficult to capture". Again, information assets were seen as being useful when serving a particular business need and would only then be identified:

"We ask the question what do we need to do to have an efficient design process, or an efficient development process, or an efficient after market service, or an efficient commercial function? We ask those questions and then say what information do we need to have in place to support that? So rather than have an inventory of information assets and then decide what to do with them, we work back from what we are trying to do as a business" Director of Strategic Planning, Company B.

Exhibit 43. Director of Strategic Planning, Company B

<table>
<thead>
<tr>
<th>Information asset identified:</th>
<th>Significance of the information asset:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation.</td>
<td>Highly important but too difficult to capture.</td>
</tr>
<tr>
<td>Development information.</td>
<td>Important for tracking development of products for legal and safety reasons specific to Company B.</td>
</tr>
</tbody>
</table>
Head of Knowledge Management, Company C

The Head of Knowledge Management of Company C, as shown in Exhibit 44 had identified a range of information assets but pointed out that management felt they had just made a start. Certain pockets of expertise in certain areas were highly developed but, overall, this interviewee described the organisation's approach to information as “just-in-time”.

“We are a long term organisation with a just-in-time approach, the desire is to leverage not to just identify” Head of Knowledge Management, Company C.

The key for the organisation’s success in the view of its Head of Knowledge Management was flexibility. This meant that information assets not in use were not seen as being significant.

Exhibit 44. Head of Knowledge Management, Company C

<table>
<thead>
<tr>
<th>Head of Knowledge Management, Company C</th>
<th>Significance of the information asset:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information asset identified:</td>
<td></td>
</tr>
<tr>
<td>Technical documentation.</td>
<td>Operational development.</td>
</tr>
<tr>
<td>Brands.</td>
<td>Central to the business and very carefully looked after.</td>
</tr>
<tr>
<td>R &amp; D Reports.</td>
<td>Managed for over 80 years and represent significant specialist information.</td>
</tr>
<tr>
<td>Quarterly reporting of staff performance.</td>
<td>Innovation dependent on staff performance.</td>
</tr>
</tbody>
</table>
Chairman, Company D

The Chairman of Company D also felt that his organisation had only just “scratched the surface” with regard to information assets. They were now “thinking” about their information assets and some had been captured using formal mechanisms such as databases. The organisation was:

“starting to think about extracting value from its information”
Chairman, Company D.

They had identified some information assets as shown in Exhibit 45, which were considered significant:

Exhibit 45. Chairman, Company D

<table>
<thead>
<tr>
<th>Information asset identified</th>
<th>Significance of the information asset:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market research database.</td>
<td>Prevents duplication of effort and provides feedback from participants.</td>
</tr>
<tr>
<td>Accounting information system.</td>
<td>Essential for management reporting but many levels of system are not used.</td>
</tr>
</tbody>
</table>

Finance Director, Company E

Finally, the Finance Director of Company E, as shown in Exhibit 46, took a similar approach to that of the senior executives in Companies A, B, and D, arguing strongly that identifying information assets was dependent on a specific business need being identified:

“We don’t look at the business along the lines of information assets. We look at the business and how we control the business on a risk-based approach. We ask what are the objectives, what are the risks to achieving those objectives and therefore what would you need to control the business? That would include information assets.
Thinking about individual information assets might just be a little abstract in a business context, you have to have some framework within which that particular idea fitted” Finance Director, Company E.

The overall message was that information assets changed as business needs changed. This view highlights the practical approach of the majority of these executives where information assets are concerned. It suggests that locating information assets within a business development framework may be a useful approach.

Exhibit 46. Finance Director, Company E

<table>
<thead>
<tr>
<th>Finance Director, Company E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information asset identified:</td>
</tr>
<tr>
<td>Information assets change as business objectives change.</td>
</tr>
</tbody>
</table>

The phrasing of Theme 3 presented a problem because, while all of the executives answered “yes”, some pointed out that they “believed” they had identified them. Also problematic was the phrase “any or all”. There was a vast difference between identifying any information assets and comprehensively identifying all of them.

Theme 4: What mechanisms are used for identifying and managing information assets?

A range of formal mechanisms was used to identify and manage information assets. The Head of Knowledge Management, Company C, used mind mapping and business process mapping to identify information assets - particularly in product development work or marketing. The Director of
Strategic Planning, Company B, and Chairman, Company D, used mainly information technology tools such as databases and management information systems for the active management of information assets. Finance Director, Company E, named tools such as intranets, extranets, database management systems, resource-planning software and Lotus Notes packages.

Finance Director, Company A, named an Executive Management team as a mechanism for identifying information assets. Its task was to set the agenda of the business, to identify business needs and then specify the information required to meet those needs.

**Theme 5: What problems are perceived in identifying information assets?**

The participants were given a choice of possible answers ranging from “Too difficult” to “Not justified” and “Not useful”.

Four out of five of the senior executives said that identifying information assets was not justified. This may reflect their companies’ standing as successful organisations which had many years’ experience of managing their internal and external information assets. They had good management in place for information assets but did not use the term asset to describe them. In the words of the Director of Strategic Planning of Company B:

> “You are trying to put a label on something that has always been around, otherwise we would not be around.”

The senior executives were then asked if they thought information assets would become more important, less important or remain unchanged in importance over the next five years.
All five felt they would become more important but the reasons given were varied:

- "Information is simply more available and accessible; the Internet has awakened interest in information" - Finance Director, Company A.
- "Businesses are becoming more complex more quickly; they need expertise in information to combat this." - Finance Director, Company A.
- "People are more information literate." - Finance Director, Company A.
- "Rate of change of the business requires information to keep up to date." - Director of Strategic Planning, Company B.
- "People simply do not know what to do with information. As more is learnt there will be more use made of information assets." - Director of Strategic Planning, Company B.
- "The desire to leverage information assets will increase as organisations look for new sales and new markets." - Head of Knowledge Management, Company C.
- "The amount of information now available means it will have to be managed." - Chairman, Company D.
- "The huge amounts of money currently being spent on information must have a result in the long term!" - Chairman, Company D.
- "Customer targeting will make information assets like customer information more important." - Finance Director, Company E.

Interestingly, the Finance Director of Company E pointed out that, while information assets would become more important for his organisation, it would remain unchanged in importance for him personally. This was because:

"The importance of information is overplayed. It is what you do with information that is important" Finance Director, Company E.
5.3.3 Summary of findings from open-ended guided interviews with five senior executives

It became clear that the concentration on identifying information assets and the methods used to manage them was far too narrow a theme for the level of interviewee. Information assets presented within an overall strategic or business performance-related framework would have been seen as being more relevant by the senior executives interviewed. The interview schedule to be used in the case study research would benefit from questions that highlight the strategic role of information in organisations. Specific questions on the value of information to organisations and the replacement costs of information assets might highlight information assets not currently used but significant for the organisation, combating a “just-in-time” approach. There was concern that only those information assets which fulfilled particular business needs should be regarded as important.

The most valuable lesson learnt from these interviews was the ability of the participants to assess a wide range of information assets in terms of their business objectives and discern uses, attributes and the importance of particular information assets. This encouraged a much more wide-ranging approach to the case study stage of the research.

The main conclusion to be drawn from the interviews is that information as an asset must be positioned within a wider business performance framework if it is to be seen as being important. This is perhaps not surprising. The argument is that information assets should be identified and managed to meet changing business objectives. In a fast-moving and competitive business environment, flexibility is seen as being crucial. There is a confidence that information assets can be acquired if needed, indicating a pragmatic approach to information and its management. It is clear that identifying all the information assets in the organisation as recommended by Burk and Horton (1988) and then assigning a value to them is not an option for these senior executives. Linking information assets to business objectives is a more difficult task. One way may be to identify the attributes of information assets considered significant by these senior executives.
5.4 Repertory grid exercises with five senior executives

Five repertory grid exercises were also conducted in early 2001 with the five senior executives in information-intensive UK organisations. These interviews aimed to identify attributes of information as an asset. The selection of the repertory grid research method and the analysis techniques employed have been described in Chapter 4, section 4.4.3 - section 4.4.9. Using WebGrid II, a grid for each of the senior executive’s information assets was first produced. A combined grid showing all the attributes of information assets was then produced.

5.4.1 How WebGrid II works

WebGrid II is based on the FOCUS program developed at Brunel University (Stewart et al. 1981, p. 57). The FOCUS program allows correlations to be made. It uses variations of cluster analysis. WebGrid II uses a distance measure (Shaw 1980, pp.159-160). These distance measures, when applied to the grid of one person, enable natural clusters to emerge, so that two dendograms of inter-element and inter-construct distances are developed (Shaw 1980). This makes the analysis much more sensitive and able to deal with five or nine point scales. FOCUS looks first at the elements and searches for correlations among them. When it finds a correlation, it joins the elements together and creates a new element, which it then prints on a vertical scale between 50 and 100 points. It continues to search until all the elements are covered. The programme then re-sorts the grid and prints the complete dendogram or tree diagram (Easterby-Smith et al.1991, pp. 84-87) with the inter-correlations on the bottom. The same process is carried out on the constructs. The grid is then re-sorted so that similar constructs are placed together.
5.4.2 Findings of the repertory grid exercises

Exhibits 47-52 show information asset dendograms to the bottom of each grid. Attribute dendograms are also shown (attribute dendograms are those to the upper right of the grid). Within the grids themselves the darker shaded areas show a high score (i.e., the asset is felt to be more significant to the right hand attribute while the whiter areas show a low score, i.e., the asset is felt to be more significant to the left hand attribute). The scale to the right, of between 50 and 100, is a percentage scale and matches are estimated at an approximate percentage point by eye. Insights are drawn from the clusters produced but these are, of course, interpretations of the executives’ grids. The percentage scale provides a means for matching assets and attributes which are similar. The closer the percentage point match the more alike these elements and attributes appear to be to the respondents. This gives an indication of which information assets (elements) and attributes (constructs) are viewed as being similar and which are viewed as being different. In WebGrid II, the “FOCUS” button is used to sort the grid, and thus bring similar elements and constructs together. Element dendograms are printed to the bottom right of the grid and construct dendograms are printed to the upper right of the grid, along a vertical scale ranging, in this case, from 50 to 100. The scale to the right, of between 60 and 100, is a percentage scale and matches are estimated at an approximate percentage point.

5.4.3 Limitations of the repertory grid method

Exhibits 47-52 show the level of statistical similarity between the different elements and constructs. There is, however, a significant problem in deciding whether the clusters are an artificial outcome of the computational process or a meaningful reflection of the interviewees’ understanding (Easterby-Smith et al. 1991). This can only really be addressed by further discussion with the interviewees. The problem is most apparent in Exhibit 52 where the clusters are initially presented but this approach was unsuccessful requiring that content analysis is also performed to gain meaning (see Exhibit 53). Given the demands on the time of the participants, it was not possible to return to them and discuss the grids in any detail. (It should be noted that Kelly’s approach
would be to return to the interviewees to clarify findings). The repertory grid works well with a limited number of interviews but is unable to manage large numbers of participants (Easterby-Smith et al. 1991). It was therefore unsuitable for use with the case study interviewees.

5.4.4 Cluster Analysis for Information Assets

Exhibit 47. Finance Director, Company A: Information assets

For Finance Director, Company A, the information assets clustered into three main groups as shown in Exhibit 47.

**Group one** contains *Organisational Information*, *People Management* and *Competitor Information*. The match between *Organisational Information* and *People Management* was 94%, showing a strong linkage of organisational information and people, as might be expected. *People Management* also linked to *Competitor Information* at 82%, showing a perception of dependence on people for competitive advantage.

**Group two** contains *Management Information* and *Legal and Regulatory*, which matched at 94% clearly linking these formal information assets.
Group three contains Supplier Information, Customer Information and Product Information. The match between Customer Information and Product Information was 88%, while Supplier Information joins Customer Information at 82%. By linking products and customers, and suppliers and customers the Finance Director of Company A shows that he sees his organisation as being flexible in a changing consumer market. He sees the organisation as being quick to meet the demands of the market, often negotiating with suppliers and changing products. It should be noted that this group did not join to the other Information Assets above 50%, reflecting perhaps the participant’s view that identification and use of information assets should change as business priorities change.

“We identify the area we want to go into and then we find the information we need.” Finance Director, Company A.

Finally, for Finance Director, Company A, Business Processes matched with Group two at 69%. Business Process and Group two matched with Group one at 63%. The Business Process information asset, having linkages with both Group two and Group one, appears to be an important asset.
For Director of Strategic Planning, Company B, the information assets also clustered into three main groups (see Exhibit 48):

**Group one** contains *Competitor Information*, *Legal and Regulatory* and *Management Information*. The match between *Competitor Information* and *Legal and Regulatory* was 75%, showing a close link between those information assets. *Legal and Regulatory* also linked with *Management Information* at 75%, showing perhaps the importance of legal and regulatory compliance for management.

**Group two** contains *Organisational Information* and *Supplier Information* which match at 75%, suggesting long standing relationships with suppliers who perhaps share the culture of the organisation.

**Group three** contains *Product Information* and *Customer Information*, which also matched at 75%, showing (as with Finance Director, Company A), a responsive approach to meeting customers’ needs and changing products.
Group two and Group three matched at 69%.

Finally, the two remaining information assets, Business Processes and People Management, matched at 69% before joining the three groups at 62%, suggesting the overarching importance of these information assets throughout the business.
For Head of Knowledge Management, Company C, the information assets clustered into four main groups (see Exhibit 49):

**Group one** contains *Legal and Regulatory* and *Supplier Information* matching at 81% and showing that little distinction was made between these two information assets by Head of Knowledge Management, Company C.

**Group two** contains *Business Processes* and *Competitor Information*, which matched at 75%. These assets differed on only one attribute (Internally-Externally), on which they were poles apart (see Exhibit 49, attribute dendogram to the upper right of the grid).

**Group three** contains *Product Information, People Management* and *Customer Information*. *Product Information* and *People Management* were strongly linked and matched at 94%. They only differed slightly in one construct (Abstract-Concrete). This indicates the strong role of employees in developing and delivering this organisation's products as construed by this executive. *Customer Information* is linked with *People Management* at 75%.
Head of Knowledge Management, Company C, seems confident in his organisation’s management of customer information but is unsure of his organisation’s people management. *Customer Information* and *People Management* differed only on one attribute (Abstract-Concrete) which occupied different poles (see Exhibit 49, attribute dendogram to the upper right of the grid).

Finally, *Organisational Information* and *Management Information* matched at 69% and then matched with Groups one, two and three at 62% suggesting these information assets are of importance.
For the Chairman, Company D, the information assets clustered into three main groups (see Exhibit 50):

**Group one** contains *Management Information* and *Organisational Information*, matching at 75%, showing these assets are closely related in the view of the Chairman.

**Group two** contains *Customer Information*, *Legal and Regulatory*, *Product Information* and *Supplier Information*. *Product* and *Supplier Information* linked at 81%, showing a relationship between products and customers. *Legal and Regulatory* matched with *Product Information* at 75%, then *Customer Information* linked at 69% with *Legal and Regulatory*. This may suggest that product and customer information are seen as being in need of legal protection by the Chairman.

**Group three** contains *People Information* and *Business Processes*, which matched at 81%, showing these assets are perceived as being closely related.

Finally, *Competitor Information* and **Groups one, two and three** linked at 62% suggesting a high level of importance for this information asset.
For Finance Director, Company E, the information assets clustered into four main groups (see Exhibit 51):

**Group one** contains *Product* and *Management Information* matching at 75%, showing little distinction was made by the Finance Director between these two assets.

**Group two** contains *Business Processes* and *Organisational Information* matching at 88% again showing little distinction between these two and perhaps suggesting the influence of culture and history on existing business processes.

**Group three** contains *Legal and Regulatory* and *Supplier Information*, which matched at 81% suggesting a concern perhaps with ensuring that contractual agreements with suppliers and partners are formalised and protected.
Group four contains Competitor Information and Customer Information, which matched at 88%. These differed slightly on only one construct (Single System Limited – Spread System Wide (see Exhibit 51, attribute dendogram to the upper right of the grid.)

Finally, People Management links up with Groups one and two at 69% and then with Groups three and four at 56% suggesting an important role for this information asset.

5.4.5 Discussion of information assets
Overall, Product and Customer Information tended to be grouped together for all the senior executives. This suggests a strong market and customer orientation for all the companies represented. The executives are successfully linking products and customers to meet the demands of fast-moving markets as increasingly sophisticated customers become more demanding. The executives perceived their organisations as being long-term bodies with “just-in-time” approaches. Only product and customer information had an overarching role. This “just-in-time” approach was also taken with their information assets. They were relying on the immediate availability of any information they require. This approach has worked well for them. The exception is Finance Director, Company E, for whom Product and Customer Information have a very weak association. This Finance Director identified managing customers as a weak area when he said:

"customer targeting is not something we are very good at."

Finance Director, Company E.
The Finance Director of Company E, as well as interviewees in Companies A, B and D, also argued strongly that identifying information assets was dependent on a specific business need being identified:

"We don't look at the business along the lines of information assets. We look at the business and how we control the business on a risk-based approach. We ask what are the objectives, what are the risks to achieving those objectives and therefore what would you need to control the business? That would include information assets. Thinking about individual information assets might just be a little abstract in a business context, you have to have some framework within which that particular idea fitted." Finance Director, Company E.

The view was that information assets changed as business needs changed. This highlights the practical approach of these executives where information assets are concerned. It suggests that locating information assets within a business development framework may be a useful approach. The senior executives also see information assets and their attributes as having a role in improving the effectiveness of, and decision-making processes in, their organisations.
5.4.6 Cluster analysis for attributes of information assets

Attributes elicited from the five senior executives were combined over the same nine categories of information assets to form one large grid (see Exhibit 52). When combined and analysed using WebGrid II, 18 of the 20 attributes (see attributes dendogram to the upper right of the grid) fell into four main groups. The attributes were re-sorted so those similar attributes are grouped close together and are reversed in some cases. Again, within the grid the darker areas show a high score, i.e., the asset was felt to be more significant to the right hand attribute, while the whiter areas show a low score, i.e., the asset was felt to be more significant to the left hand attribute. Information assets are also shown in the bottom right dendogram. The scale to the right, of between 60 and 100, is a percentage scale and matches are estimated at an approximate percentage point. The cluster groups start with the most similar and then the next most similar until all the constructs are clustered.

Presentation of the attributes in this way helps to visualise the range of attributes identified. Exhibits 47-51 show which constructs have been elicited from each of the senior executives in their individual grids. It is clear from Exhibit 52, however, that the clusters have emerged more from the process of WebGrid II performing the analysis than from the distinctions made by the executives. Where the constructs seem relevant, this was noted on the individual grids presented in Exhibits 47-51. It proved very difficult to assign any labels to the construct groups. A content analysis was also performed on the attributes to attempt to gain more insight (see Exhibit 53).
FOCUS Combined grid, Domain: Attributes of information as an asset

Context: Identification of attributes of information as an asset, 9 Information assets, 20 Attributes

Exhibit 52. Combined grid: attributes of information assets
High matches indicate that the relevant attributes share a similar or identical rating for the majority of the information assets.

Four main clusters emerged:

Group one contains:

"Outputs-Inputs", "Internally-Externally", "Shaped by management-Shaped by external factors" and "Changes Slowly-Changes quickly".

"Internally-Externally" and "Shaped by management-Shaped by external factors" match at 92%.

"Internally-Externally" joins to "Outputs-Inputs" at 78%.

"Changes slowly-Changes quickly" and "Shaped by management-Shaped by external factors" match at 78%.

Group two contains:

"What we are dealing with-How to deal with", "Single system (limited)-Spread system (wide)", "Quantitative-Qualitative", "Legal focus-Customer focus", "Intended performance-Market performance" and "Past-Future".

"Intended performance-Market performance" and "Past-Future" matched at 81%.

"What we are dealing with-How to deal with", "Single system (limited)-Spread system (wide)" matched at 78%.

"Quantitative-Qualitative", "Legal focus-Customer focus" also linked at 78%.
Group three contains:

"Abstract-Concrete", "Priority-Sub Priority", "Unpredictable-Straightforward" and "Information about the business-Vehicle for the business".

"Unpredictable-Straightforward" and "Information about the business-Vehicle for the business" joined at 83%.

"Abstract-Concrete" and "Priority-Sub Priority" joined at 78%.

"Unpredictable-Straightforward" and "Priority-Sub Priority" joined at 78%.

Group four contains:

"Flexible-Prescriptive", "Internal-External", "Future-Past", "Core Business-Future Business".

"Internal-External" and "Future-Past" matched at 78%.
"Flexible-Prescriptive" and "Internal-External" also linked at 78%. As did "Future-Past" and "Core Business-Future Business".

Finally, the two remaining attributes were "Less control-Level of Control" and "Guidance and background-Strategy and foreground".
Exhibit 53. Content analysis for attributes of information as an asset

<table>
<thead>
<tr>
<th>Categories</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning and control</td>
<td>Outputs-Inputs</td>
</tr>
<tr>
<td></td>
<td>Less control-Level of control</td>
</tr>
<tr>
<td></td>
<td>Intended performance-Market performance</td>
</tr>
<tr>
<td></td>
<td>Unpredictable-Straightforward</td>
</tr>
<tr>
<td>Managing internal and external operating</td>
<td>Shaped by management-Shaped by external factors</td>
</tr>
<tr>
<td>environments</td>
<td>Internal-External</td>
</tr>
<tr>
<td></td>
<td>Internally-Externally</td>
</tr>
<tr>
<td>Organisational direction/Momentum/Orientation</td>
<td>Past-Future</td>
</tr>
<tr>
<td></td>
<td>Future-Past</td>
</tr>
<tr>
<td></td>
<td>Core business-Future business</td>
</tr>
<tr>
<td></td>
<td>Information about the business-Vehicle for the business</td>
</tr>
<tr>
<td></td>
<td>Priority-Sub Priority</td>
</tr>
<tr>
<td>Decision-making</td>
<td>Guidance and background-Strategy and foreground</td>
</tr>
<tr>
<td>Information assets</td>
<td>What we are dealing with-How to deal with (for example, product information</td>
</tr>
<tr>
<td></td>
<td>is what we are dealing with, business process information tells us how</td>
</tr>
<tr>
<td></td>
<td>to deal with)</td>
</tr>
<tr>
<td></td>
<td>Single system (limited)-Spread system (wide)</td>
</tr>
<tr>
<td></td>
<td>(for example, a customer database was seen as a single system and</td>
</tr>
<tr>
<td></td>
<td>management information as a spread system)</td>
</tr>
<tr>
<td></td>
<td>Quantitative-Qualitative (for example, product information was seen as</td>
</tr>
<tr>
<td></td>
<td>mainly quantitative and organisational information as mainly qualitative)</td>
</tr>
</tbody>
</table>
Legal focus-Customer focus (for example, legal and regulatory information was seen as having a legal focus and customer information a customer focus)

Abstract-Concrete (for example, a customer database was seen as concrete and organisational information as abstract)

Prescriptive-Flexible (for example, legal and regulatory information was seen as prescriptive whereas organisational information was seen as flexible)

In Exhibit 53, five main categories for attributes of information assets were identified: Planning and control, Managing internal and external operating environments, Organisational direction/Momentum/Orientation, Decision-making and Information assets.

These categories provide a more focused listing of attributes than did the repertory grid analysis.
5.4.7 Discussion of attributes of information assets

It was clear that the attributes of information assets described by the senior executives were not the same as those identified as being significant in the information science literature. A strategic role for information assets in planning and control, managing internal and external operating environments, providing organisational direction and momentum in decision-making was found. Attributes were described in terms of the inherent qualities of information assets and in terms of the information asset as a resource in itself. This suggests that executives at such senior levels in an organisation expect quality and accuracy in their information assets to be taken as given (whether such quality and accuracy exists has not been investigated). They see information assets and their attributes as having a role in improving the effectiveness of, and decision-making processes in, their organisations. The attributes identified by the senior executives were varied and numerous and gave a great deal of insight into the attributes of information assets. There is a notable absence of economic attributes. Economic attributes were identified from the literature e.g. shareable (Arrow 1984) and exchanged and traded (Orna 1996). The absence of economic attributes suggests that the recognition of the “value of information” is still a prime area of difficulty and one which will not be easily solved.
5.4.8 Summary of findings of repertory grid

The attributes of information as an asset which were identified point to a much wider range of attributes than those hitherto described in the information science literature. It also shows that some attributes are not identified as being significant. In particular, economic attributes were not identified by the senior executives. Greater attention needs to be directed toward emphasising the attributes of information as an asset related to overarching business objectives rather than inherent and accepted qualities of information as an asset. The main conclusion to be drawn from the interviews is that information as an asset must be positioned within a wider business performance framework if it is to be seen as being significant. This is perhaps not surprising. The argument is that information assets should be identified and managed to meet changing business objectives. In fast-moving and competitive business environments, flexibility is critical and information assets and their attributes do have a role to play.
5.5 Open-ended guided interviews with six internationally-active information professionals

5.5.1 Interview themes

The seven themes addressed in the interviews were:

- Theme 1. The value of information and its measurement.
- Theme 2. The impact of the concepts of knowledge management and intellectual capital.
- Theme 3. The acquisition and use of information and the embedding of good practice.
- Theme 4. The relevance of these questions to other industry sectors. Are they more relevant issues for some sectors?
- Theme 5. Identification of attributes of information assets.
- Theme 6. Information assets and organisational effectiveness.
- Theme 7. Impact of identification and measurement of information assets on the perceptions of senior managers.

The themes progressed from general questions which addressed policy issues in the value of information, measurement and organisational learning fields to more specific questions that aimed to identify information assets, their attributes and the impact of their identification and measurement on the perceptions of senior managers.

5.5.2 Findings of open-ended guided interviews with six internationally-active information professionals

Theme 1. The value of information and its measurement.

None of the six interviewees said they could see any real progress being made in the value of information field. Indeed, measuring the value of information was full of difficulties. One major difficulty was the "shareability" of information. Information is shareable, it can be given away and retained at the
same time (Yates-Mercer & Bawden 2002, p.20). This was seen by the Senior academic interviewed as being the greatest barrier to investment in information:

"Managers do not want to invest in something they cannot own or see."

A second reason given by the Executive Director of Information Services was a lack of understanding among people of information as a concept in itself. Without a basic grasp of the fundamental concept of information as an abstract yet value-creating entity it was very difficult to convince people that effort should be expended in valuing it:

"Trying to value information is asking the wrong question – we need to develop into people a better understanding of information."

One of the clearest and most strongly felt reasons for no progress being made in measuring the value of information was the situational nature of information use. The dynamic nature of information and its ability to change value in particular situations and contexts or for particular individuals was seen as being critical. Measuring information independently was not a viable option, there was a need to:

"Assess information within particular contexts" Research Director.

Achieving a measurement of information even within a limited context is still extremely difficult. The measurement of attributes of information assets provides a more promising approach. These comments confirmed an approach that focused on the long-term future economic benefits which information assets promise.
Theme 2. The impact of concepts of knowledge management and intellectual capital.

The concepts of knowledge management and intellectual capital have been both connected with, and divorced from, information management in its traditional form. As discussed in Chapter 2, both knowledge management and information management take a systematic life-cycle approach where a process of creation, use, distribution and ultimately disposal or reuse are foremost. However, knowledge management goes further than information management in linking such processes to organisational learning and the creation of future value-added. Information management aims to support business objectives, whatever they may be.

For the six internationally-active experts, an information management approach was preferable; the ability of knowledge management and intellectual capital concepts to be applied across diverse contexts was seen as a drawback rather than a benefit:

"The concepts do not help information professionals at all. There are so many different contexts and it is not practiced" Research Director.

A lack of practical examples of the concepts being applied was seen as the major reason why they had little impact by the Executive Director of Information Services:

"There has been lots of theorising and developing of models but knowledge management has never really taken off" Executive Director of Information Services.
And,

“They are not practiced very much in the wider business community. Organisations are well-organised and using lots of tools to put their products in the marketplace rather than actually managing knowledge” Senior academic.

An interesting view was that the concepts have had an impact in highlighting the role people play in creating value for organisations:

“Managing knowledge means managing people” Head of UK-based Research School.

They had also improved the general perception of information professionals in the wider business community by:

“Unlinking with the traditional ideas of the information professional” University Librarian.

The interviewees saw the concepts having an impact on the people management rather than information management capabilities of organisations. The interviewees highlighted individual employee inputs and competencies. In practice, the concepts had little impact, according to the interviewees.

Theme 3. The acquisition and use of information and the embedding of good practice.

The information auditing literature (e.g., Orna 1999, 2004; Henczel 2001) has highlighted the missed opportunities which organisations face when they do not embed lessons learned from information management but expend their energies in acquiring and using masses of information which may or may not fulfil business objectives.
The leveraging of information assets to create business value depends on organisations and their members successfully acquiring, using and embedding good information management practice. Acquisition and use of information are carried out successfully by the vast majority of organisations. Yet, when lessons are to be learned, these are often not recognised and, as a result, when similar problems reoccur new solutions have to be found. There is little reuse or evaluation of existing information assets. Such use of information assets may become mechanistic rather than creative so that innovation is limited.

The interviewees did recognise a disparity between an organisation’s effectiveness in acquiring, using and embedding information assets. They saw a role for information professionals in enabling their organisations to move towards the concept of a learning organisation by embedding organisational learning practice.

Indeed, all employees and the information systems they used had a role to play in developing a learning organisation. Embedding good information management practice was, however, a difficult task:

"Have to learn how to be learning organisations. Knowledge management systems can help with that. Need to involve all employees but encouraging sharing and exchange of information is an uphill battle. Have to set up processes which are built into work rather than trying to change the culture. If it is not built into the system then people will ignore it." Senior academic.

And,

"There is a role for everybody in handling information but some have an advanced role" Research Director.

The Director of Information Services saw the lack of embedding of good practice as an education issue. Organisations and their members simply did
not understand the issues which information management engendered. It was the role of information professionals to address this:

"There is a prime need to educate people. It is difficult to embed good information management practices as there is a lack of understanding of information issues. Need to be realistic and practical and information professionals need to meet the challenges."

A different viewpoint was offered by the University Librarian who argued that organisations would embed good information management practice only when they could see that real improvements were being made. Information professionals needed to create more opportunities for good practice:

"Need to see improvement rather than embed it. Offer more opportunities for lessons to be learnt or organisations will find other people to do it."

Theme 4. The relevance of these questions to other industry sectors. Are they more relevant issues for some sectors?

The relevance of issues such as the value of information, the impact of knowledge management and intellectual capital and the embedding of good practice to areas other than the information-intensive organisations which were to be targeted in case study work was of interest in evaluating whether the research was capable of being applied to other industry sectors. The six internationally-active information professionals and academics were well positioned to provide comments on this.

Two of the interviewees (Senior academic and Director of Information Services) saw these issues as being of greatest importance in the health sector. This was because:
"The health sector is more important. Such questions have an impact on decision-making processes and information gathering" Senior academic.

And,

"The health sector - technology has given information professionals an opportunity to be pro-active rather than reactive" Director of Information Services.

The Head of UK-based Research School argued that there were sectors where these issues were not of importance, for example, in running small bed and breakfasts, but added:

"I would be very surprised to find a sector which did not need to address the problem" Head of UK-based Research School.

The Executive Director of Information Services saw the issues as being of more relevance to academia and education - especially as distance learning provided students with increasing choice in their learning experience:

"Education and education on-site versus distance education."

The Research Director saw the issues as being of more relevance to fast-paced and time-sensitive industries rather than slow-moving industries:

"More relevant to time-sensitive industries like financial investing rather than slow-moving industries like manufacturing."

Finally, the University Librarian saw them as being of more relevance to the commercial sector than the not-for-profit sector:

"More relevant to the profit sector than the not-for-profit sector e.g. Government agencies."
Overall, the six interviewees saw the issues of value of information, the impact of knowledge management and intellectual capital and the embedding of good practice as being relevant to a wide range of sectors but these were predominantly information-intensive such as the health sector, education and financial services. This may indicate that there is little scope for applying these issues to more traditional industry sectors.

Theme 5. Identification of attributes of information as an asset.

Earlier interviews and a literature review to identify attributes of information assets (Oppenheim et al. 2003a) had identified three major types of attributes, those inherent to the information asset itself (such as utility) and those which arose from the impact of information assets, (such as improved effectiveness or productivity). Economic attributes form the third category. The six internationally-active information professionals were asked to identify attributes of a given set of information assets to test whether these highly-experienced individuals found it easy or difficult to identify attributes. Overall, a wide range was identified:

<table>
<thead>
<tr>
<th>Head of UK-based Research School</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
</tr>
<tr>
<td>Customer information</td>
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<tr>
<td>Competitor information</td>
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<tr>
<td>Product information</td>
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<tr>
<td>Business process information</td>
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<tr>
<td>Management information</td>
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<tr>
<td>People management information</td>
</tr>
<tr>
<td>Supplier information</td>
</tr>
<tr>
<td>Legal and regulatory information</td>
</tr>
<tr>
<td>Organisational information</td>
</tr>
<tr>
<td>“Culture”</td>
</tr>
<tr>
<td><strong>Attributes</strong></td>
</tr>
<tr>
<td>Accuracy</td>
</tr>
<tr>
<td>Timeliness</td>
</tr>
<tr>
<td>Thinking</td>
</tr>
<tr>
<td>Expertise</td>
</tr>
<tr>
<td>Rely on people</td>
</tr>
<tr>
<td>Accuracy</td>
</tr>
<tr>
<td>Accuracy</td>
</tr>
<tr>
<td>Extremely timely</td>
</tr>
<tr>
<td>Background information</td>
</tr>
<tr>
<td>Limited need</td>
</tr>
</tbody>
</table>
### Senior academic

<table>
<thead>
<tr>
<th>Assets</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer information</td>
<td>Degree of understanding</td>
</tr>
<tr>
<td>Competitor information</td>
<td>Timeliness Accuracy Relevance</td>
</tr>
<tr>
<td>Product information</td>
<td>Detail Timeliness Accuracy Accessibility</td>
</tr>
<tr>
<td>Business process information</td>
<td>Timeliness Accuracy Accessibility</td>
</tr>
<tr>
<td>Management information</td>
<td>Availability</td>
</tr>
<tr>
<td>People management information</td>
<td>Granularity</td>
</tr>
<tr>
<td>Supplier information</td>
<td>Accuracy Know what is available</td>
</tr>
<tr>
<td>Legal and regulatory information</td>
<td>Stumbling distance</td>
</tr>
<tr>
<td>Organisational information</td>
<td>Participate Complicated</td>
</tr>
<tr>
<td>“Culture”</td>
<td>Learn culture</td>
</tr>
</tbody>
</table>

### Attributes
- Degree of understanding
- Timeliness
- Accuracy
- Relevance
- Detail
- Timeliness
- Accuracy
- Accessibility
- Availability
- Granularity
- Accuracy
- Know what is available
- Timeliness
- Accessibility
- Stumbling distance
- Participate
- Complicated
- Learn culture

### Director of Information Services

<table>
<thead>
<tr>
<th>Assets</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer information</td>
<td>Insightful Depth</td>
</tr>
<tr>
<td>Competitor information</td>
<td>Benchmarking</td>
</tr>
<tr>
<td>Product information</td>
<td>Price</td>
</tr>
<tr>
<td>Business process information</td>
<td>Depth Differentiation</td>
</tr>
<tr>
<td>Management information</td>
<td>Focus</td>
</tr>
<tr>
<td>People management information</td>
<td>Honesty</td>
</tr>
<tr>
<td>Supplier information</td>
<td>Completeness</td>
</tr>
<tr>
<td>Legal and regulatory information</td>
<td>Format Accurate Up to date</td>
</tr>
<tr>
<td>Organisational information</td>
<td>Essential Completeness</td>
</tr>
<tr>
<td>“Culture”</td>
<td></td>
</tr>
</tbody>
</table>

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### Research Director

<table>
<thead>
<tr>
<th>Assets</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer information</td>
<td>Importance</td>
</tr>
<tr>
<td>Competitor information</td>
<td>Situational</td>
</tr>
<tr>
<td>Product information</td>
<td>Timeliness, Accuracy</td>
</tr>
<tr>
<td>Business process information</td>
<td>Situational</td>
</tr>
<tr>
<td>Management information</td>
<td>Accuracy</td>
</tr>
<tr>
<td>People management information</td>
<td>Political dimensions</td>
</tr>
<tr>
<td>Supplier information</td>
<td>Timeliness, Accuracy</td>
</tr>
<tr>
<td>Legal and regulatory information</td>
<td>Situational</td>
</tr>
<tr>
<td>Organisational information</td>
<td>Political dimensions</td>
</tr>
<tr>
<td>“Culture”</td>
<td></td>
</tr>
</tbody>
</table>

### Executive Director of Information Services

<table>
<thead>
<tr>
<th>Assets</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer information</td>
<td>Specific</td>
</tr>
<tr>
<td>Competitor information</td>
<td>Interesting</td>
</tr>
<tr>
<td>Product information</td>
<td>Accuracy</td>
</tr>
<tr>
<td>Business process information</td>
<td>Timeliness</td>
</tr>
<tr>
<td>Management information</td>
<td>Thinking</td>
</tr>
<tr>
<td>People management information</td>
<td>Viewpoints</td>
</tr>
<tr>
<td>Supplier information</td>
<td>Criticality</td>
</tr>
<tr>
<td>Legal and regulatory information</td>
<td>Copyright</td>
</tr>
<tr>
<td>Organisational information</td>
<td>Face to face approach</td>
</tr>
<tr>
<td>“Culture”</td>
<td></td>
</tr>
</tbody>
</table>
Accuracy and Timeliness were the attributes most often identified. However, a whole range of attributes such as Communication, Understanding and even Honesty also emerged as central concerns of the interviewees. This indicates that not only can inherent attributes of information assets be readily identified, but that less tangible and esoteric attributes are also of interest and should be explored more fully. Economic attributes did appear, (e.g. price), but were scarce.
Theme 6. Information assets and organisational effectiveness.

As discussed in Chapter 2, organisational effectiveness was defined as:

An organisation is effective to the extent that it achieves what it sets out to achieve and the route to this involves doing the right things.

The role of information assets in enhancing organisational effectiveness is difficult to define. While information assets underpin many organisational activities, they are not often identified as separate value-creating resources. While they contribute to organisational effectiveness, their impact is often hidden until they are either removed or lost. Five of the interviewees said that they saw a role for information assets in enhancing organisational effectiveness. One (Research Director) argued that information assets and organisational effectiveness could not be separated from the political dimensions of organisations. No amount of good information management would counter a political environment where information was ignored:

“What matters is politics” Research Director.

Among those who did see a role for information assets in enhancing organisational effectiveness, difficulties were also identified:

“Information management can make organisations more effective but it is very difficult to isolate information as the key factor” Head of UK-based Research School.

And,

“Information can improve effectiveness but have to apply yourself to using information and build use into systems” Senior academic.
Theme 7. Impact of identification and measurement of information assets on the perceptions of senior managers.

This theme was drawn from the assertion by Eaton and Bawden (1991, p.163) that the value of information was dependent on “context and use” and that attempts to measure it simply limited its dynamic capabilities. Eaton and Bawden (1991, p.156) pointed out that “if information is a resource, it is different in kind from most others”. They argued that identifying information as a resource had become shorthand for “information is important.” The value of information was not quantifiable (Eaton & Bawden 1991, p.163). In other words, concentration on quantifying information detracted from the dynamic role which information played in organisations. Attempts to measure value limited the dynamic nature of information and ultimately destroyed innovation in organisations.

However, in my view, the subjectivity and the situational nature of information value needs to be balanced with the need to manage and exploit information assets for enhanced organisational effectiveness. This research study sought to argue that, while the value of information was subjective, a focus on value did have a positive impact on the perceptions of senior managers. Such attempts have helped to make concrete abstract concepts such as information, thereby improving understanding and ultimately creating greater opportunities for the exploitation of information assets.

The interviewees were divided on this issue. The Head of the UK-based Research School argued:

“Recognition of information is already apparent. There is evidence in very large firms. Measurement is not in conflict with creative applications.”
The Senior academic also argued:

"Need to demonstrate value if organisations are going to take advantage. It is a real asset that does not blow away in the wind. The more you demonstrate the value the more value will be put on it."

However, the Director of Information Services argued that:

"Depends on learning style of the organisation. Can convince some people by measuring, others see it as time wasting. Measurement is not neutral, it affects performance and this can affect the dynamic role of information."

And,

"Depends on the culture of the organisation. Can have unobtrusive measurement. Use versus understanding are two very different parts of information management" University Librarian.

The use of information was emphasised by the University Librarian as an area where the research had the potential to uncover examples of how information assets helped senior managers to create value for their organisations. Previously, the data collection had concentrated on the identification and measurement of attributes of information assets rather than their use. Planning for the subsequent case studies gained a focus on the use of information assets. Non-routine decision-making provided concrete examples of information in use.
5.5.3 Summary of findings of open-ended guided interviews with six internationally-active information professionals

The six internationally-active information professionals had strong and considered opinions which arose from many years' experience in the information and libraries field. They clarified many of the issues the research addressed and encouraged an open rather than limited view of information assets and their impact on organisational effectiveness. They also benefited the design of later case studies, highlighting the situational nature of information use and the importance of obtaining examples of information use in organisations. Although largely informal, the interviews were invaluable in providing assurance that the issues being addressing were of relevance to information professionals and academics who were expert in their field.
5.6 Summary

A summary of the major findings of the preliminary research is given in Exhibit 54.

Exhibit 54. Summary table of findings of preliminary research

<table>
<thead>
<tr>
<th>Findings</th>
<th>Findings</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior British information managers’ focus group.</td>
<td>Revised information assets and attributes.</td>
<td>Need to check relevance of attributes to today’s senior managers.</td>
</tr>
<tr>
<td>Guided interviews and repertory grid exercises with five senior executives.</td>
<td>Overarching importance of product and customer information.</td>
<td>Need to move away from numeric scoring system to more visual style.</td>
</tr>
<tr>
<td></td>
<td>Uses of information assets identified were: planning and control, managing internal and external operating environments, providing organisational direction and momentum for those involved in decision-making.</td>
<td>Importance of business strategy and strategic role for information assets.</td>
</tr>
<tr>
<td>Guided interviews with six internationally-active information professionals.</td>
<td>Role for information assets in enhancing organisational effectiveness.</td>
<td>Economic attributes identified only rarely.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use of information assets central in demonstrating value.</td>
</tr>
</tbody>
</table>
5.7 Conclusion
The preliminary research provided a critical step in developing, focusing and clarifying the issues addressed in this research study. The focus group with senior British information managers updated and revised the information assets and attributes identified from the literature and encouraged a value driven rather than measurement approach. The open-ended guided interviews with five senior executives and repertory grid exercises widened the focus of the research from the identification and measurement of attributes of information assets to highlight a more strategic role for information assets. The wide range of attributes identified in the repertory grid exercises pointed to a rich vein of previously unexplored attributes. The open-ended guided interviews with six internationally-active information professionals focused the research on practical examples of information assets in use leading to the collection of examples of non-routine decision-making during the case study work. A role for information assets in enhancing organisational effectiveness was recognised by many of the participants in the preliminary research.
CHAPTER 6

6. FINDINGS OF CASE STUDY DATA

In this chapter, findings of the case study research are presented. An introduction, Section 6.1, is followed by analysis of the information asset-scoring grids completed for each case study, Section 6.2. Findings of the open-ended guided interviews are presented in Sections 6.3 and 6.4. The chapter concludes with a Summary and Conclusions, Sections 6.5 and 6.6.

6.1 Introduction

Four case studies were conducted in information-intensive UK organisations during late 2001 and early 2002. A total of 45 senior managers were interviewed. The organisations comprised three corporate and one public sector entity. The case study interviews commenced with the completion of an information asset-scoring grid by the senior managers. Interviews were then conducted using an open-ended guided interview schedule.
6.2 Information asset and attributes scoring grids
Senior managers in the four case study organisations were asked to complete individual information asset-scoring grids. The scoring grid provided an introduction to a range of information assets, including traditional assets such as Customer Information and less widely recognised assets such as Organisational Information “Culture”. The genesis and updating of the information assets and attributes presented in the grid and the scoring system employed have been described in Chapter 4.

6.2.1 Findings of the information asset and attribute scoring grids
Findings are shown individually for each grid completed, with senior managers identified by their job title. Senior managers scored information assets and attributes using a gold, silver and blue star system. These were then outputted as Excel Charts and the most significant assets and attributes scored (gold) were counted for each manager. Where the senior manager gave all the information assets and attributes a gold star, the word “All” is used to describe this approach. Excel Charts were generated for both information assets and attributes. The information asset and attributes scored as Most Significant for each Case Study organisation are shown in Exhibits 55-58. (The term “Significant” is not used in a statistical sense but rather it denotes the importance of the information asset or attribute to the senior manager). In all, 44 information asset and attribute scoring grids out of a possible 45 were completed. An Executive Director, Case study 2, did not complete the grid saying that he preferred to concentrate on issues concerning his own organisation. Exhibit 59 provides a summary of the most important information assets and attributes scored by the senior managers for all the case study organisations.
Exhibit 55. Case study 1 - Most significant information assets and attributes by manager

<table>
<thead>
<tr>
<th>Job title</th>
<th>Information assets</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead Consultant</td>
<td>Business processes</td>
<td>Quality</td>
</tr>
<tr>
<td></td>
<td>Product information</td>
<td>Utility</td>
</tr>
<tr>
<td></td>
<td>Management information</td>
<td></td>
</tr>
<tr>
<td>Business Area Manager</td>
<td>Customer information</td>
<td>Effectiveness</td>
</tr>
<tr>
<td></td>
<td>Product information</td>
<td>Quality</td>
</tr>
<tr>
<td>Quality Manager</td>
<td>Organisational information</td>
<td>Quality</td>
</tr>
<tr>
<td></td>
<td>“Culture”</td>
<td>Utility</td>
</tr>
<tr>
<td>Director of Technical Consulting</td>
<td>Customer information</td>
<td>Quality</td>
</tr>
<tr>
<td></td>
<td>Business processes</td>
<td></td>
</tr>
<tr>
<td>Lead Consultant 1</td>
<td>Product information</td>
<td>Quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Effectiveness</td>
</tr>
<tr>
<td>Lead Consultant 2</td>
<td>Organisational information</td>
<td>Quality</td>
</tr>
<tr>
<td></td>
<td>“Culture”</td>
<td></td>
</tr>
<tr>
<td>Computer Services Manager</td>
<td>Organisational information</td>
<td>Effectiveness</td>
</tr>
<tr>
<td></td>
<td>“Culture”</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Customer information</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Competitor information</td>
<td></td>
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<tr>
<td></td>
<td>Product information</td>
<td></td>
</tr>
<tr>
<td>Director</td>
<td>Product information</td>
<td>Productivity</td>
</tr>
<tr>
<td></td>
<td>Business processes</td>
<td>Financial/Economic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other</td>
</tr>
<tr>
<td>Financial Controller</td>
<td>Competitor information</td>
<td>Quality</td>
</tr>
<tr>
<td></td>
<td>Management information</td>
<td>Utility</td>
</tr>
<tr>
<td>Managing Director</td>
<td>Product information</td>
<td>Utility</td>
</tr>
<tr>
<td></td>
<td>Management information</td>
<td>Financial/Economic</td>
</tr>
<tr>
<td></td>
<td>Legal and regulatory</td>
<td></td>
</tr>
<tr>
<td>Principal Consultant</td>
<td>Customer information</td>
<td>Quality</td>
</tr>
<tr>
<td></td>
<td>Product information</td>
<td>Utility</td>
</tr>
<tr>
<td>Lead Consultant 3</td>
<td>All</td>
<td>Quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Utility</td>
</tr>
<tr>
<td>Business Area Manager</td>
<td>Organisational information</td>
<td>Quality</td>
</tr>
<tr>
<td></td>
<td>“Culture”</td>
<td>Productivity</td>
</tr>
<tr>
<td></td>
<td>Management information</td>
<td></td>
</tr>
<tr>
<td>Human Resources Manager</td>
<td>All</td>
<td>Quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Utility</td>
</tr>
</tbody>
</table>
As shown in Exhibit 55, Quality was identified as the most important attribute by senior managers in Case study 1. (A count of the number of occurrences of each attribute scored gives this result). Product information, Customer information and Organisational information “Culture” information assets were also rated.

A focus on the Quality of information assets and on Product and Customer information assets shows an awareness of the wealth of internal knowledge and experience in the organisation in dealing with commercial imperatives. The scoring of Organisational information “Culture” may indicate that the senior managers recognise substantial cultural barriers exist in the organisation to exploiting information assets.

The organisation had undertaken a major restructure programme. Some of the senior managers interviewed saw restructuring as a positive step. The new business groupings were clearly defined and reporting structures visible. The restructuring was identified, however, by several senior managers as hindering information sharing and information management capabilities. Business groupings encouraged a focus on making one’s own group successful rather than contributing to the success of a holistic organisation. This was referred to as “siloing” by some senior managers:

“There’s internal tension to make the best of your business unit and use your resources best before perhaps you think about other resources in the company but that’s inevitable by setting up separate profit and loss areas. I wouldn’t say competition as such but the restructuring creates that. The geography from the point of view of creating a better bottom line is a good thing, but from the point of managing information it’s possibly something we need to stand back and look at.” Lead Consultant 3, Case study 1.
Exhibit 56. Case study 2 - Most significant information assets and attributes by manager

<table>
<thead>
<tr>
<th>Job title</th>
<th>Information assets</th>
<th>Attributes</th>
</tr>
</thead>
</table>
| Process Control Manager | Customer information  
 | Competitor information  
 | Product information | Quality  
 |                          | Effectiveness  
 |                          | Other          |
| Programme Manager    | Customer information  
 | People management       | Productivity  
 |                          | Utility        |
| Engineering Director | Business processes  
 | Management information | Quality  
 |                          | Utility        |
| Commercial Manager   | Customer information  
 | Business processes      | Effectiveness    |
| IT Director          | Customer information  
 | Supplier information  
 | Organisational information  
 | “Culture”               | Utility  
 |                          | Effectiveness  
 |                          | Financial/Economic |
| Technical Manager    | Customer information | Quality  
 |                          | Utility        |
| Marketing Manager    | Competitor information | Financial/Economic |
| Financial Controller | All                      | Productivity    |

As seen in Exhibit 56, the eight grids completed showed a strong identification of Customer information as the most important asset. Competitor information and Business Processes were also scored. Attributes such as Quality and Utility were identified as being important. The identification of Customer Information as an important asset reflects the organisation’s customer-oriented approach. The Managing Director’s commitment to engendering a customer service ethos among all staff is apparent. The Managing Director of this organisation said that difficulty was encountered in his organisation not, for example, in managing internally-generated customer information but in acquiring such information from customers in the first instance. Customers often relied on his organisation to provide their order and sales information.
The identification of Financial and Economic attributes of information assets as important by the IT Director and Marketing Manager is interesting in an organisation with a traditional product base operating in a static market. The organisation had experienced exceptional growth (by taking market share from a bigger but less flexible competitor) over the previous few years and many of the senior managers saw future growth and efficiency as being dependent on the continued development of an information technology infrastructure that was "world class". The organisation had carefully cultivated technological leadership in its sector and, although it was competing on price and efficiency, its main competitive advantage arose from its innovative use of the Internet and Information and Communications Technology (ICT).
As can be seen from Exhibit 57, the marginally more important assets were Management information and Business processes. Quality was the most highly scored attribute followed by Utility. This public sector organisation (Case study 3) did not score Customer information as frequently as the three other organisations in the information asset-scoring grid. The organisation was in the mid stages of implementing a five-year ICT strategy. The strategy had highlighted the commercial possibilities of internally-generated information that the organisation had built up over a number of years and this had led to a clear focus on improving the exploitation of information assets.
### Exhibit 58. Case study 4 - Most significant information assets and attributes by manager

<table>
<thead>
<tr>
<th>Job title</th>
<th>Information assets</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finance Director</td>
<td>People management</td>
<td>Utility</td>
</tr>
<tr>
<td></td>
<td>Organisational information</td>
<td>Productivity</td>
</tr>
<tr>
<td></td>
<td><strong>&quot;Culture&quot;</strong></td>
<td></td>
</tr>
<tr>
<td>Managing Director – Business</td>
<td>Customer information</td>
<td>Effectiveness</td>
</tr>
<tr>
<td>Development</td>
<td>Organisational information</td>
<td>Quality</td>
</tr>
<tr>
<td></td>
<td><strong>&quot;Culture&quot;</strong></td>
<td></td>
</tr>
<tr>
<td>Director of Transportation</td>
<td>Customer information</td>
<td>Quality</td>
</tr>
<tr>
<td>Software</td>
<td>Product information</td>
<td>Productivity</td>
</tr>
<tr>
<td>Director – Business Unit</td>
<td>All</td>
<td>Quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Effectiveness</td>
</tr>
<tr>
<td>Director – Corporate Services</td>
<td>Customer information</td>
<td>Quality</td>
</tr>
<tr>
<td></td>
<td>Competitor information</td>
<td>Utility</td>
</tr>
<tr>
<td>Human Resources Manager</td>
<td>All</td>
<td>Quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Financial/Economic</td>
</tr>
<tr>
<td>Marketing Information Systems</td>
<td>Customer information</td>
<td>Quality</td>
</tr>
<tr>
<td>Systems Manager</td>
<td>Organisational information</td>
<td>Utility</td>
</tr>
<tr>
<td></td>
<td><strong>&quot;Culture&quot;</strong></td>
<td></td>
</tr>
<tr>
<td>Manager – Information Resources</td>
<td>Customer information</td>
<td>Quality</td>
</tr>
<tr>
<td></td>
<td>Organisational information</td>
<td>Effectiveness</td>
</tr>
<tr>
<td></td>
<td><strong>&quot;Culture&quot;</strong></td>
<td></td>
</tr>
<tr>
<td>Divisional Director</td>
<td>All</td>
<td>Productivity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Financial/Economic</td>
</tr>
<tr>
<td>Senior Manager</td>
<td>Product information</td>
<td>Quality</td>
</tr>
<tr>
<td></td>
<td>Management information</td>
<td>Productivity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Financial/Economic</td>
</tr>
<tr>
<td>Senior Engineer</td>
<td>Product information</td>
<td>Quality</td>
</tr>
<tr>
<td></td>
<td>Supplier information</td>
<td>Utility</td>
</tr>
<tr>
<td>Board Director</td>
<td>Product information</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td>Legal and regulatory</td>
<td></td>
</tr>
</tbody>
</table>

As can be seen from Exhibit 58, of the nine information assets scored, Customer information was of the most importance to the senior managers in Case study 4. It was followed by Organisational information "Culture", reflecting a concern with internal communication structures. Product
information was also scored highly. Quality was the most highly scored attribute followed by Utility and Productivity.

The organisation was described by the senior managers as very large, diverse and geographically dispersed around the UK where 80% of its offices are based. Rapid growth of the organisation had resulted in frequent restructuring and management changes. The more recent of these had resulted in its current structure of fifteen strategic business units that were “customer facing”. Strategy was high on the agenda, with a great deal of senior management effort expended on developing a common vocabulary so that common goals could be met from a shared starting point. As in Case study 1, individual business units were in internal competition and this was seen by some managers as a barrier to information sharing:

“Not so much custodians as hoarders! And that’s just the culture. One of the reasons for that is that during the recession of the 90’s, late 80’s, early 90’s, we were only about 2000 strong, we went into the recession and were split up into different units. People were told that if they made a profit they would survive, if they made a loss they would be cut and everyone learned to do exactly as they wanted in order to achieve that. They came out of the recession with something like 8000 strong. They’d taken over other companies that had gone to the wall and added value and then they were trying to bring them back centrally which is a hard job when they’ve been divided. The fact that they’d be controlled from somewhere, that’s one of the reasons for hoarding, fragmented units and constant re-structuring, there’s been three since I’ve been here.” Manager, Information Resources, Case study 3.
As shown in Exhibit 59, Customer information was scored most highly by the managers in Case studies 1, 2, and 4. Management information was scored most highly by managers in Case study 3. Attributes of Quality were scored as important by senior managers in all four case study organisations. The information asset and attribute scoring grids provided a focused overview of a range of information assets and attributes. The grids encouraged managers to discriminate between different information assets and attributes using a simple scoring system.
Collecting the data using a novel and innovative tool such as the information asset scoring grid provides a new approach to presenting and scoring attributes of information assets. The information asset and attribute scoring grid is innovative in a number of ways:

- The information asset scoring grid is unique in providing an opportunity, through the “Other” category, for critically important information assets and attributes to be individually identified by senior managers whilst also providing focus on a range of commonly identified attributes and assets.

- The information asset scoring grid provides a visual picture of information assets and attributes using a colourful grid structure. This makes concrete traditionally abstract concepts in an immediate and visually attractive way for busy senior managers and challenges traditional perceptions of information as static and dormant.

- The information asset scoring grid provides an instant rating of attributes of information assets so that managers can immediately view the impact of their scoring of various information assets and attributes.

- The information asset scoring grid creates a sense of ownership of information assets and attributes for senior managers having been generated from practical work with the focus group of senior British information managers and repertory grid interviews with five senior executives.

Finally, the information asset-scoring grid provided a useful introduction to the open-ended guided interviews which formed the major component of the case study research.
6.3 Open-ended guided interviews – case studies

Findings are presented for the open-ended guide interviews conducted with 45 senior managers in four case study organisations. Five major themes were covered in the open-ended guided interviews. These themes are:

1. The organisation and information strategy (O + IS).
2. The organisation and its effectiveness (O + E).
3. Identifying information assets (IIA).
4. Using information assets (UIA).
5. Measuring the effects of information assets (M).

6.3.1 Theme 1: The Organisation and information strategy

Theme 1 Question 1 The organisation and information strategy

Theme 1 Question 1 asked participants to rate their organisation against seven statements relating to information management in their organisation on a one to five scale with one being Strongly Agree and five being Strongly Disagree. Participants were asked to explain their scores and these comments were used for textual analysis. Textual analysis, using ATLAS/Ti, provided insight into the strategic vision of the case study organisations. Analysis of scores in Excel provided prompt feedback reports to case study participants at the conclusion of the case study visit, since analysis could be performed quickly.

Case study 1

The senior managers interviewed generally saw their organisation’s information strategy as being poor. There was a good awareness of the issues involved in managing information and in creating usable and accessible information assets which were protected and managed adequately. However, this was hampered by a lack of information systems and infrastructure according to interviewees.
Case study 2
Many of the senior managers interviewed said that the management and application of information technology to their business, especially through use of the Internet, was exceptional. There was a great deal of emphasis on creating structured databases and information systems to help in achieving competitive advantage in a technically-demanding product area. Emphasis was on providing access to customers and suppliers over an international global network. The building of knowledge bases through contributions from employees was less successful; this was especially apparent in the introduction of an electronic library. Overall the scores were high, but this may have been as a result of an exceptional IT department rather than the existence of good information management strategies.

Case study 3
Many of the senior managers scored the organisation highly on information strategy. This was due, in the main, to a recent information audit that had been carried out by an independent consultant. The senior managers cited the information audit as an example of the organisation’s awareness of the importance of information. The audit had yet to be implemented within the organisation’s overall strategy.
Case study 4

Senior managers said the organisation was actively addressing information strategy. However, there were reservations. In particular, there was concern about the management of information life cycles. There seemed to be no policy in place for evaluating the relevance of historical and current information resources across this large organisation or their value to the organisation. In particular, many of the senior managers were concerned about project information which, in their view, was not being captured in a reusable or knowledge-creating format.

There was no formal information strategy in any of the four case study organisations. Rather, the area was included within ICT.

Theme 1 Question 2 (a) Information assets and the management agenda

Of the 45 senior managers who participated in interviews, 33 said that information assets featured on the management agenda for their organisations. Twelve said that they did not. By case study, (see Exhibit 60), these were:

Exhibit 60. Information assets and the management agenda

<table>
<thead>
<tr>
<th></th>
<th>No. of managers</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case study 1</td>
<td>14</td>
<td>12</td>
<td>2</td>
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<td>Case study 2</td>
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<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Case study 3</td>
<td>10</td>
<td>10</td>
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<tr>
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<td>5</td>
<td>7</td>
<td>12</td>
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<tr>
<td>Total</td>
<td>45</td>
<td>33</td>
<td>12</td>
<td>45</td>
</tr>
</tbody>
</table>

Many senior managers gave examples of concrete information assets such as new accounting systems and customer databases as evidence that information assets featured on the management agenda. When asked later what information assets their organisation had identified as being important, these concrete information assets also featured. Less concrete assets, especially
those which related to people management were, however, also identified and especially by senior managers in Case study 3.

**Theme 1 Question 2 (b) Discuss the value of information assets**

As can be seen in Exhibit 61, some 38 senior managers said that the value of information assets was discussed in management meetings, whereas seven senior managers said it was not discussed.

**Exhibit 61. Discuss the value of information assets**

<table>
<thead>
<tr>
<th></th>
<th>No. of managers</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
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<td>4</td>
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<tr>
<td>Case study 2</td>
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<td>9</td>
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<tr>
<td>Case study 3</td>
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<td>Case study 4</td>
<td>12</td>
<td>10</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>45</strong></td>
<td><strong>38</strong></td>
<td><strong>7</strong></td>
<td><strong>45</strong></td>
</tr>
</tbody>
</table>

The senior managers (38) who said they discussed the value of information assets were asked to describe what kinds of issues were raised in these discussions, see Theme 1 Question 2 (c). Those who said the value of information assets were not discussed (7) were asked why they thought this issue did not feature on the management agenda; see Theme 1 Question 2 (d).

The recognition of the value of information was a central issue. A Senior Manager, Case study 2, stated that his position as a board director in the organisation was “implicit recognition” of the value of information in his organisation:

“Strongly agree. IT is a board position which is implicit recognition of the value.” IT Director, Case study 2.
Theme 1 Question 2 (c) Discuss the value of information assets – Issues raised

When asked what issues were raised when the value of information assets was discussed, comments included: reusing information, customer relationship management, communication, the value of people, implementing electronic information systems and duplication of resources. Reusing project-based information was of major concern to the two project-based organisations studied, Case study 1 and Case study 4.

The reuse of project-based information is of increasing concern since new accounting treatments (Roberts & Felsted 2002, p.12) have meant that the costs of putting together bids and tendering for contracts can no longer be written off. This makes the bidding process far more expensive as many contracts are not in fact won. Case studies 1 and 4 were using their intranets and, in the case of Case study 4, knowledge management systems to optimise project planning and bidding processes. Much effort was directed towards improving communication among staff so that lessons from previous projects could be used to speed the contract bidding process. Similarly, publicising skill sets of key staff involved in and available for project-based work meant that bids with named participants could be put together quickly.

Case study 1 encountered difficulties in implementing its intranet; a lack of use was identified as an issue of concern. The organisation planned a document management system to give the intranet “critical mass” which it believed would improve usage by employees throughout the organisation. This would then lead to more re-use of existing project-based information in the organisation.

“I think a lot of the work we do can be repeated. I don't think that we necessarily make as much use of the knowledge that we've gained in doing a piece of work in the next job.” Director of Technical Consulting, Case study 1.
The reuse of information was also an important issue for Case study 4:

“How do you replicate and extract value time and time again? We use our knowledge to try and reinvent a solution instead of sitting back and saying if we have a real set of processes here we don’t just fish the solution out of the filing cabinet, and modify it a little bit. We tend to say we’ve got a lot of knowledge, let’s create the solution and then we find out right, well that’s a very similar solution to one we created five years ago, and all that time and effort, and I think that shows that we haven’t yet got the process that means hang on, haven’t we seen that issue, that problem before? Yes, we have, well, go and look at that, and what was the solution? It was this, we can modify the same solution, we could save thousands of man hours and boost our profits.” Board Director, Case study 4.

Theme 1 Question 2 (d) Value of information not discussed

Of those who said the value of information was not discussed (7), the reasons given for not discussing the value were well thought out. Information value was not discussed because it had an automatic role in the “higher level” management of the business:

“We don’t discuss the value of the information as such, rather we discuss it because it has a role in the management of the higher level stuff.” Area Manager, Case study 3.
Difficulties involved in quantifying the value of information, as identified in the literature review (Reuters 1995, p.5), were also raised by the Managing Director of Case study 1, who said:

“Because I think we find it difficult to quantify. Our clients don't, if you like, buy my knowledge generally in a sort of a nice quantified way. They tend to buy effort and therefore it's actually quite difficult to get to. If we put that much effort in and had better deployment of knowledge, how much more would our customers pay? It's not an easy sum to do.” Managing Director, Case study 1.

There appeared to be little incentive to value information assets. Customer demands were for value-added services rather than quantifiable goods.
Theme 1 Question 2 (e) Monetary value

Some 12 senior managers said they placed a monetary value on information assets whereas 33 said they did not, as shown in Exhibit 62.

Exhibit 62. Monetary value of information assets

<table>
<thead>
<tr>
<th></th>
<th>No. of managers</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case study 1</td>
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<td>Case study 4</td>
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<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>12</td>
<td>33</td>
<td>45</td>
</tr>
</tbody>
</table>

Traditional measures such as cost and time saving featured as the most often used monetary measures:

“Yes, we do put monetary value on them. We have just introduced a new financial system into the company which actually will make productivity savings over the course of the next financial year, and that's an information asset, so yes we do. Saving overheads, manpower and time.” Lead Consultant, Case study 1.
There was recognition that monetary measures were limited - especially in terms of knowledge value:

“I think we had difficulty understanding how to do that. We were looking at the cost of recruitment and therefore the cost of not managing retention and that has been identified as an issue but what we haven’t looked at is the loss of particular key skills or key knowledge bearers really. And that is difficult then to put a monetary value on. We haven’t gone down the line to management and said...what would be the loss of that person or that person, what is their knowledge value?” Human Resource Manager, Case study 4.

For those who said they did not place a monetary value on information assets, the subjective nature of information value appeared to be the major factor. There was an awareness also that value resided in less tangible areas such as people management. There was concern that, since different information assets became important at different times and for different purposes, values were constantly changing. Quality of information was again important, the idea that up-to-date information was of more value than outdated information was an important issue:

“No, I don’t think we consider information assets as having a value, we obviously know which bits of information are valuable at a given time. Yesterday’s bid, which might have been a winning bid, has a lot more value than one we did two years ago.” Senior Manager, Case study 4.
Theme 1 Question 2 (f) Rank the value

The idea of ranking information assets was used as a way of identifying whether senior managers were discriminating between information assets in terms of their value. This would not necessarily involve placing a monetary value on information assets. However, even fewer senior managers (10) said that they ranked the value of information assets compared to those who placed a monetary value on information assets (12). A total of 35 senior managers said they did not rank the value of information assets, as shown in Exhibit 63.

Exhibit 63. Rank the value of information assets

<table>
<thead>
<tr>
<th></th>
<th>No. of managers</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
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<tbody>
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</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>10</td>
<td>35</td>
<td>45</td>
</tr>
</tbody>
</table>

Examples of ranking include:

"It'll be ranked on whether it's good for the people, good for the clients, good for the profitability of the business and efficiency of the business." Director of Technical Consulting, Case study 1.

And,

"Yes, definitely, Health & Safety information, for example, is more important than other types of information." Training Manager, Case study 3.
6.3.1.1 ATLAS/Ti analysis Theme 1: Information strategy

A central view of the data for Theme 1: Information strategy was created using ATLAS/Ti.

Exhibit 64. Information strategy – Business Manager – Case study 1

In Exhibit 64, the issue of Information strategy is seen within the context of Management attention. Associated issues are the Management agenda and Information assets. Business Manager, Case study 1 says that the value of information is not discussed but that information assets such as the Contact management system and Corporate picture are discussed. Attributes of information assets identified are Maintenance, Recognition and Delivery. Maintenance of information assets is identified as part of the risk analysis strategy of the organisation with an added caveat that maintenance should be appropriate. The Recognition of information assets is seen as part of Management attention, which is also an attribute of information assets. In addition, Delivery, for example, delivery of products on time to customers, is related to appropriate Management attention being given.
In Exhibit 65, the issue of Information strategy is seen within the context of Management attention with an attribute of Investment. Associated issues are the Management agenda and Information assets. Human Resources Manager, Case study 2 identifies Competitive advantage as an information asset with an attribute of Monetary value. Information assets and their ranking in terms of value are discussed within the context of the Management agenda. Management attention is an attribute of the value of information assets.
In Exhibit 66, the issue of Information strategy is seen within the context of Management attention. Associated issues are the Management agenda and Information assets, which for the Board Director are seen within the context of Business Information. Competitive advantage is given as an information asset and the issue associated with this is the organisation’s Databases. The existence of Business information determines the Management attention given to Information assets. An attribute of Management attention is Investment and there is also a part relationship between Management attention and Responsibility as Investment decisions require responsibility to be taken. The Value of information is discussed, in particular, in relation to the commercialisation of information assets such as Trademarks and Databases. The issue associated with commercialisation is Future Economic Benefit which results in Competitive advantage for the organisation and feeds back into Management attention.
In Exhibit 67, the issue of Information strategy is not seen within the context of Management attention. Associated issues are the Management agenda and Information assets which are seen within the context of the Economic well being of the organisation. Competitive advantage is an information asset which is partly related to the maturity of the organisation’s information. The attribute identified as important is the Structure of information assets which has a part relationship to Future Economic Benefit for the organisation. Failure to Structure information effectively is seen as the result of the Value of information not being discussed.

Commonalities between Exhibits 64-67
Competitive advantage was identified by three senior managers (Exhibits 65, 66 and 67) as a factor when considering their organisation’s information strategy. Management attention was also identified as a factor by three senior managers (Exhibits 64, 65 and 66).
6.3.2 Theme 2: The organisation and effectiveness

Theme 2 Question 3 (a) and (c) Is your organisation effective? Is it becoming more or less effective over time?

Senior managers were first asked to describe whether they considered their organisations were effective. They were then asked to give a definition of organisational effectiveness for them and their team. The order of the questions may seem inappropriate but it was hoped that by not asking for an early definition of organisational effectiveness more thought would be given to the impact of organisational effectiveness. The effectiveness or ineffectiveness of the organisation provided a clear starting off point which situated the interviewee within the Theme. Senior managers were then asked to describe whether their organisations were becoming more effective, less effective or remaining the same over time. Effectiveness is seen as a long-term proposition.

Some 38 senior managers described their organisations as effective, as shown in Exhibit 68. Of these, 31 said their organisations were effective and becoming more effective. Three said their organisations were effective but becoming less effective and four said their organisations were effective and remaining the same. Seven senior managers described their organisations as ineffective. Of these, four said their organisations were ineffective but becoming more effective, two said their organisations were ineffective and becoming less effective and one said his organisation was ineffective and remaining the same.
Exhibit 68. Effectiveness, becoming more or less effective or remaining the same

<table>
<thead>
<tr>
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<th>I</th>
<th>E+M</th>
<th>E+L</th>
<th>E+S</th>
<th>I+M</th>
<th>I+L</th>
<th>I+S</th>
</tr>
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<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
| Total           | 45 | 38 | 7   | 31  | 3   | 4   | 4   | 2   | 1

Key: E = Effective, I = Ineffective, E+M = Effective and becoming more effective, E+L = Effective and becoming less effective, E+S = Effective and remaining the same, I+M = Ineffective and becoming more effective, I+L = Ineffective and becoming less effective, I+S = Ineffective and remaining the same.

Becoming more effective was seen in terms of access to both individual and corporate experience and the leveraging of that experience:

“I think we could be substantially more effective if we were able to rapidly access the best individual experience and the best corporate experience and deploy it onto each project.” Managing Director, Case study 1.
Becoming less effective was identified by senior managers in Case study 1 with the restructuring of the business which was seen as creating barriers to information sharing:

“I think less, it’s because we have restructured which has had various positive aspects for the business in the sense that it compartmentalises profit and loss areas, but what it also does is create to a certain degree some barriers about information assets, less knowledge in one group about what the other group is doing.” Lead Consultant 3, Case study 1.

Becoming less effective was also identified with being unable to keep up with the pace of change in information and resulted in competitive disadvantage.

“No, it is not effective and I worry that it’s going to become less effective than it was – it’s going back to the point about the pace of change of information, it’s becoming greater and greater and my concerns are that large companies such as us are unable to respond to that increasing pace whereas smaller companies are and will be. My concern is that we will become less competitive as a result of that.” Senior Engineer, Case study 4.
Theme 2 Question 3 (b) Define organisational effectiveness

Senior managers were asked to define organisational effectiveness for themselves and their team. Definitions of organisational effectiveness varied from specifics such as meeting clients' expectations to more general definitions such as achieving objectives:

"Well, organisational effectiveness is really the ability to meet client expectations and therefore generate continuing work." Director of Software Development, Case study 4.

And,

"For the corporate body it's achieving its objectives and all these subsidiary bits. It's whatever its objectives are, and the extent to which we achieve those is, I think, organisational effectiveness." Board Secretary, Case study 3.

A disparity between internal and external effectiveness was illustrated by a Senior Manager, Case study 3. In his organisation, Customer complaints were going down making the organisation externally more effective but employee satisfaction was also going down making it internally less effective:

"I suppose its customer satisfaction. The levels of complaint for customers are getting lower, but internally the employee satisfaction level is falling." Area Manager, Case Study 3.
The effectiveness of people was also an important aspect of organisational effectiveness:

"I think as the business changes over time from very much a small business to medium to a larger business, the effectiveness of new employees is important. The time in which they can become effective is dependent on us managing information better. The same knowledge management system, allows quite inexperienced people to specify a product. They probably still need an underlying engineering knowledge but we are doing all we can in order to make the new employees more effective. I think that is one of our biggest challenges as we grow over time. Getting new people of the right standard and giving them the information. It's very easy when you have got a small organisation to manage knowledge. You can't have one expert at the end of the 'phone anymore when you have got a large business." IT Director, Case study 2.
Definitions of organisational effectiveness given are summarised in Exhibit 69:

Exhibit 69. Summary of definitions of organisational effectiveness

<table>
<thead>
<tr>
<th></th>
<th>Customer satisfaction/delivery/quality of product</th>
<th>Achieving objectives/strategy</th>
<th>Cost effectiveness/profit/market share</th>
<th>People/culture/decision-making/optimum working</th>
<th>Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case study 1</td>
<td>√</td>
<td>√</td>
<td></td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Case study 2</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Case study 3</td>
<td>√</td>
<td></td>
<td>√</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Case study 4</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
<td>√</td>
</tr>
</tbody>
</table>

As can be seen in Exhibit 69, the most common definition of organisational effectiveness across the four case study organisations concerned achieving customer satisfaction, the delivery of products and services and quality of those products and services focusing on external effectiveness. Senior managers in Case studies 1 and 2 gave definitions related to internal effectiveness such as improved decision-making and optimum working but the overall emphasis was on external effectiveness in relation to meeting clients' expectations and needs.
The role of information assets in enhancing organisational effectiveness was described in terms of improving communication:

"Communication at the moment. Until recently there was no real construct apart from word of mouth to deliver operational, I mean corporate information and operational information apart from going and telling someone which is fine, but that's not being methodically pre-designed in terms of communication strategy, message audience and delivery method.” Principal Consultant, Case study 1.

And, identifying hoarders of information assets:

"I think it’s central, there are a lot of people issues. There are a lot of pressures on meeting financial targets which are area driven, therefore people are holding on to that information. On the basis we have the right information we can perhaps do a job more effectively and therefore make more money out of it, yes.” Business Manager, Case study 1.
Information assets were also seen to have a role in enhancing the effectiveness of decision-making which required good quality information assets:

“Their role is very important because a lot of the decision-making, certainly more detailed decision-making analysis, will stem from good quality information assets and if we get that right then the more high-level decision-making, more conceptual decision-making probably would be more accurate, more relevant. Thinking of the bottom-up approach, to get to the higher level, if you’ve got good quality information assets that will feed into the pyramid and should ensure that when it comes to the crunch decisions, all the right factors have been considered and that’s how I see it. Management need to check their strategy and to check their strategy again they need good quality information assets to test the strategy and confirm its relevance or otherwise. Either way you look at it, information assets are very important.” Head of internal audit, Case study 3.
6.3.2.1 ATLAS/Ti analysis: Theme 2: The organisation and effectiveness

Exhibit 70. Organisation and effectiveness – Managing Director – Case study 1

In Exhibit 70, the definition of organisational effectiveness given by Managing Director, Case study 1, is based on securing Competitive Advantage based on Price and Production. The organisation is Effective and making Improvements in his view. Information assets provide context for his definition of organisational effectiveness but only in as far as they are related to Competitive Advantage and Production. Organisational effectiveness feeds back into Competitive Advantage so that these two concepts are linked.
In Exhibit 71, Commercial Manager, Case study 2, sees his organisation as Effective but becoming Less effective. His definition of organisational effectiveness is phrased in terms of Rapid Response to Customers and Accuracy. Information Assets provide context for the definition of organisational effectiveness. Time Constraints and a “just-in-time” approach to information assets means that the organisation is becoming less effective. Commercial Manager, Case study 2, ascribes this loss in effectiveness to the rapid growth of the organisation, saying it is a “Victim of its own success”.

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In Exhibit 72, Head of Policy, Case study 3, sees his organisation as Effective and becoming More effective. The definition of organisational effectiveness given focuses on Cost and Quality and People Management. People Management is defined as an Information Asset within the context of Organisational effectiveness. Understanding in the context of People Management is also an attribute of the definition of Organisational effectiveness and is identified as an Information Asset.
In Exhibit 73, Senior Manager, Case study 4, provides a definition of information assets with attributes of Development and Trying to be better. The organisation is becoming More effective. Trying to be better is part of Management Attention which has related issues of People Management and Communication. People Management is defined as an Information Asset and Communication is seen as an attribute of Information assets. Information assets are seen in the context of Organisational effectiveness, particularly in promoting Development, People Management and Communication.

Commonalities between Exhibits 70-73
Information assets were identified by all four senior managers when considering organisational effectiveness and their organisations.
6.3.3 Theme 3: Identifying information assets

Theme 3 Question 4(a) Identifying information assets

A total of 39 senior managers said their organisations had identified information assets considered important for the business. Six said their organisation had not identified any such information assets. As can be seen in Exhibit 74, three of these six senior managers then went on to identify information assets which they themselves considered were important (Manager identified – MI information assets).

Exhibit 74. Organisation and manager identified (MI) information assets

<table>
<thead>
<tr>
<th></th>
<th>No. of managers</th>
<th>Yes</th>
<th>No</th>
<th>MI</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case study 1</td>
<td>14</td>
<td>12</td>
<td>1</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>Case study 2</td>
<td>9</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Case study 3</td>
<td>10</td>
<td>9</td>
<td>1</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Case study 4</td>
<td>12</td>
<td>9</td>
<td>1</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>39</td>
<td>3</td>
<td>3</td>
<td>45</td>
</tr>
</tbody>
</table>
Theme 3 Question 4 (b) and (c) What are the information assets and what are their attributes?

A wide range of information assets were identified. The senior managers were also asked to describe attributes of the information assets they identified. Customer information was identified by the senior managers as an information asset in all the case study organisations. Attributes concerned with the Quality and Utility of information assets (e.g. up to date, accessible, accurate) were identified as important attributes. Quality of information was a major concern, for example:

"The problem I've got is that it’s taking me 12 hours at least to gather information and that should be at the press of a button and where I want to go for the future it needs to be a press of a button. But we need to make sure that the system, the information in the system is good quality so we can use reports because at the moment we're having to do it long hand.” Engineering Director, Case study 2.

The wide range of information assets and attributes identified by the senior managers demonstrate that “one size does not fit all”. The different business environments of the four case study companies produced a variety of information assets and attributes which are individualistic but reflect dynamic business environments.

Exhibits 75-78 show the range of information assets and attributes that the senior managers said their organisations had identified. Some senior managers also identified assets which they said their organisations had not recognised but which they saw as being critical for the organisation. As shown in Exhibit 74, these are identified as Manager Identified assets (MI) (Case study 1 and 4 and Exhibits 75 and 78 have extended titles to include these). Senior managers were asked to describe attributes of the information assets they or their organisations had identified. Where they do not describe any attributes this is shown by the term “None given”. Senior managers tended to list a number of assets and then list attributes for only one or two of those assets.
Exhibit 75. Case study 1 – Organisation and manager identified (MI) assets and attributes

<table>
<thead>
<tr>
<th>Job title</th>
<th>Information assets</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Resources Manager</td>
<td>Company policies</td>
<td>Accuracy</td>
</tr>
<tr>
<td>Business Area Manager (MI)</td>
<td>Contact information</td>
<td>Quality</td>
</tr>
<tr>
<td>Lead Consultant 1</td>
<td></td>
<td>Up to date</td>
</tr>
<tr>
<td>Quality Manager</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Area Manager (MI)</td>
<td>Contract management</td>
<td>Accessibility</td>
</tr>
<tr>
<td>Principal Consultant</td>
<td>Corporate and financial</td>
<td>Quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Timeliness</td>
</tr>
<tr>
<td>Lead Consultant 3</td>
<td>Corporate track record</td>
<td>Appropriate level</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Concise</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Usability</td>
</tr>
<tr>
<td>Managing Director Quality Manager</td>
<td>Customer information</td>
<td>Customer satisfaction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quality</td>
</tr>
<tr>
<td>Principal Consultant</td>
<td>Customer related</td>
<td>None given</td>
</tr>
<tr>
<td>Computer Services Manager</td>
<td>Customers</td>
<td>Acted upon</td>
</tr>
<tr>
<td>Financial Controller</td>
<td></td>
<td>Not time consuming</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Purpose</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Usability</td>
</tr>
<tr>
<td>Director</td>
<td>Domain knowledge</td>
<td>None given</td>
</tr>
<tr>
<td>Computer Services Manager</td>
<td>Employees</td>
<td>Time saving</td>
</tr>
<tr>
<td>Director</td>
<td>Financial information</td>
<td>Accuracy</td>
</tr>
<tr>
<td>Quality Manager</td>
<td></td>
<td>Judgement</td>
</tr>
<tr>
<td>Business Area Manager (MI)</td>
<td>Focused on customers</td>
<td>Accuracy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Timeliness</td>
</tr>
<tr>
<td>Human Resources Manager</td>
<td>Recruitment information</td>
<td>Accuracy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Director</td>
<td>Information systems</td>
<td>Accuracy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clarity of presentation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Timeliness</td>
</tr>
</tbody>
</table>
Exhibit 75. continued Case study 1 – Organisation and manager identified (MI) assets and attributes

<table>
<thead>
<tr>
<th>Lead Consultant 1</th>
<th>Internet</th>
<th>None given</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead Consultant 2</td>
<td>Management information</td>
<td>Future planning Management decisions</td>
</tr>
<tr>
<td>Director of Technical Consulting</td>
<td>Marketing material</td>
<td>None given</td>
</tr>
<tr>
<td>Managing Director</td>
<td>Measurement and quantification</td>
<td>None given</td>
</tr>
<tr>
<td>Principal Consultant Quality Manager</td>
<td>Operational performance</td>
<td>None given</td>
</tr>
<tr>
<td>Managing Director</td>
<td>Past outputs</td>
<td>None given</td>
</tr>
<tr>
<td>Principal Consultant</td>
<td>People appraisals</td>
<td>None given</td>
</tr>
<tr>
<td>Computer Services Manager</td>
<td>Planned document management system</td>
<td>None given</td>
</tr>
<tr>
<td>Director of Technical Consulting</td>
<td>Processes</td>
<td>Efficiency</td>
</tr>
<tr>
<td>Lead Consultant 2</td>
<td>Project cycles</td>
<td>Quality assurance</td>
</tr>
<tr>
<td>Managing Director</td>
<td>Regulatory information</td>
<td>None given</td>
</tr>
<tr>
<td>Managing Director</td>
<td>Relevant experience</td>
<td>Accessibility Transferable</td>
</tr>
<tr>
<td>Director of Technical Consulting</td>
<td>Reuse knowledge</td>
<td>None given</td>
</tr>
<tr>
<td>Director of Technical Consulting</td>
<td>Sales support material</td>
<td>None given</td>
</tr>
<tr>
<td>Lead Consultant</td>
<td>Series of databases</td>
<td>Accuracy Cohesiveness In time Market relevance Transport electronically</td>
</tr>
<tr>
<td>Human Resources Manager</td>
<td>Training</td>
<td>Ease of access</td>
</tr>
<tr>
<td>Lead Consultant 1</td>
<td>Yellow pages (in house directory of staff)</td>
<td>None given</td>
</tr>
</tbody>
</table>
Exhibit 76. Case study 2 – Organisation identified assets and attributes

<table>
<thead>
<tr>
<th>Job title</th>
<th>Information assets</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Director</td>
<td>Business processes</td>
<td>None given</td>
</tr>
<tr>
<td>Engineering Director</td>
<td>Business system</td>
<td>None given</td>
</tr>
<tr>
<td>Process Control Manager</td>
<td>CAD (Computer-aided design) system</td>
<td>None given</td>
</tr>
<tr>
<td>IT Director</td>
<td>Commercial information</td>
<td>None given</td>
</tr>
<tr>
<td>Marketing Manager</td>
<td>Customer database</td>
<td>Accuracy, Efficiency, Time saving</td>
</tr>
<tr>
<td>Commercial Manager</td>
<td>Customer Databases</td>
<td>Empowerment, Control and monitor, Speed of reaction</td>
</tr>
<tr>
<td>Technical Manager</td>
<td>Design</td>
<td>None given</td>
</tr>
<tr>
<td>Engineering Director</td>
<td>Electronic library</td>
<td>Centralised information, Lost information, Repetitive cycle, Access</td>
</tr>
<tr>
<td>Commercial Manager</td>
<td>Electronic systems</td>
<td>Quality</td>
</tr>
<tr>
<td>Programme Manager</td>
<td>Internet</td>
<td>Contact with customers, Empowerment</td>
</tr>
<tr>
<td>Engineering Director</td>
<td>Intranet</td>
<td>Communication tool, Manage procedures</td>
</tr>
<tr>
<td>Technical Manager</td>
<td>Manufacturing database</td>
<td>Delivery</td>
</tr>
<tr>
<td>Process Control Manager</td>
<td>Nominal ledger</td>
<td>Compliance</td>
</tr>
<tr>
<td>Executive Director</td>
<td>Operational information</td>
<td>Position against competitors, Profit</td>
</tr>
<tr>
<td>Technical Manager</td>
<td>Personnel</td>
<td>None given</td>
</tr>
</tbody>
</table>
Exhibit 76. continued  Case study 2 -- Organisation identified assets and attributes

<table>
<thead>
<tr>
<th>Role</th>
<th>Asset Type</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Director</td>
<td>Product database</td>
<td>Control data</td>
</tr>
<tr>
<td>IT Director</td>
<td></td>
<td>Easy to use</td>
</tr>
<tr>
<td>Financial Controller</td>
<td></td>
<td>Time saving</td>
</tr>
<tr>
<td>Process Control Manager</td>
<td></td>
<td>Access</td>
</tr>
<tr>
<td>IT Director</td>
<td>Product information</td>
<td>None given</td>
</tr>
<tr>
<td>Programme Manager</td>
<td>Quarterly action plans</td>
<td>Effectiveness</td>
</tr>
<tr>
<td>Financial Controller</td>
<td>Salary database</td>
<td>Accuracy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confidentiality</td>
</tr>
<tr>
<td>Financial Controller</td>
<td>Sales order history</td>
<td>retrievability</td>
</tr>
<tr>
<td>IT Director</td>
<td>Software</td>
<td>None given</td>
</tr>
<tr>
<td>Technical Manager</td>
<td>Training</td>
<td>Access</td>
</tr>
<tr>
<td>IT Director</td>
<td>Training database</td>
<td>None given</td>
</tr>
</tbody>
</table>
### Exhibit 77. Case study 3 – Organisation identified assets and attributes

<table>
<thead>
<tr>
<th>Job title</th>
<th>Information assets</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director of Finance and Support</td>
<td>Background information (Intranet)</td>
<td>Improves relationships</td>
</tr>
<tr>
<td>Head of Information Systems</td>
<td>Booking system</td>
<td>None given</td>
</tr>
<tr>
<td>Director of Finance and Support</td>
<td>Customer databases (Intranet)</td>
<td>Concise, Personalisation, Relevant information</td>
</tr>
<tr>
<td>Area Manager Head of Information Systems Legal Officer</td>
<td>Customer information (Intranet)</td>
<td>Accuracy, Currency, Legal costs, Source of information</td>
</tr>
<tr>
<td>Head of Policy</td>
<td>Customers needs</td>
<td>None given</td>
</tr>
<tr>
<td>Head of Internal Audit Head of Information Systems</td>
<td>Databases (Intranet)</td>
<td>Accuracy, Ease of access, Easy to use, Flexibility, Openness</td>
</tr>
<tr>
<td>Legal Officer</td>
<td>Electronic information</td>
<td>None given</td>
</tr>
<tr>
<td>Head of Policy</td>
<td>Financial information</td>
<td>None given</td>
</tr>
<tr>
<td>Board Secretary</td>
<td>Know-how</td>
<td>None given</td>
</tr>
<tr>
<td>Director of Training Strategy</td>
<td>Labour market information</td>
<td>Accuracy, Comprehensiveness, Credible</td>
</tr>
<tr>
<td>Director of Training Strategy</td>
<td>Networking intelligence</td>
<td>Reality checks</td>
</tr>
<tr>
<td>Board Secretary</td>
<td>Publications</td>
<td>None given</td>
</tr>
<tr>
<td>Training Manager</td>
<td>People management</td>
<td>Communication</td>
</tr>
<tr>
<td>Director of Training Strategy</td>
<td>Skill demand data</td>
<td>Currency</td>
</tr>
<tr>
<td>Board Secretary</td>
<td>Web sites</td>
<td>None given</td>
</tr>
</tbody>
</table>
### Exhibit 78. Case study 4 – Organisation and manager identified (MI) assets and attributes

<table>
<thead>
<tr>
<th>Job title</th>
<th>Information assets</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Engineer (MI)</td>
<td>As built information</td>
<td>Intuitive</td>
</tr>
<tr>
<td>Managing Director – Business Development</td>
<td>Business development</td>
<td>None given</td>
</tr>
<tr>
<td>Director – Business Unit</td>
<td>Business intelligence</td>
<td>Indicator</td>
</tr>
<tr>
<td>Human Resources Manager</td>
<td>Client information</td>
<td>Access</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consistency</td>
</tr>
<tr>
<td>Managing Director – Business Development</td>
<td>Commercial information</td>
<td>None given</td>
</tr>
<tr>
<td>Finance Director</td>
<td>Competitive advantage</td>
<td>Expertise</td>
</tr>
<tr>
<td>Finance Director – Corporate Services</td>
<td>Customer information</td>
<td>Accessibility</td>
</tr>
<tr>
<td>Marketing Information Systems Manager (MI)</td>
<td>Enquiry system</td>
<td>Group wide</td>
</tr>
<tr>
<td>Board Director</td>
<td>Experience</td>
<td>None given</td>
</tr>
<tr>
<td>Director – Corporate Services</td>
<td>Financial information</td>
<td>None given</td>
</tr>
<tr>
<td>Managing Director – Business Development</td>
<td>Health &amp; Safety information</td>
<td>Currency</td>
</tr>
<tr>
<td>Senior Manager</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managing Director – Business Development</td>
<td>Intranet</td>
<td>Communication</td>
</tr>
<tr>
<td>Senior Manager</td>
<td></td>
<td>Intuitive</td>
</tr>
<tr>
<td>Director of Software Development</td>
<td></td>
<td>Key tool</td>
</tr>
<tr>
<td>Divisional Director</td>
<td>Intranet areas</td>
<td>Accessibility</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coding</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Structure information</td>
</tr>
<tr>
<td>Job title</td>
<td>Information assets</td>
<td>Attribute</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Senior Engineer (MI)</td>
<td>Land management</td>
<td>None given</td>
</tr>
<tr>
<td>Marketing Information Systems</td>
<td>Marketing database</td>
<td>Usability</td>
</tr>
<tr>
<td>Manager (MI)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Board Director</td>
<td>People's knowledge</td>
<td>Understanding</td>
</tr>
<tr>
<td>Board Director</td>
<td>Produce solutions</td>
<td>None given</td>
</tr>
<tr>
<td>Senior Engineer (MI)</td>
<td>Services information</td>
<td>None given</td>
</tr>
<tr>
<td>Director – Corporate Services</td>
<td>Staff information</td>
<td>Regularly updated</td>
</tr>
<tr>
<td>Finance Director</td>
<td>Supply chain</td>
<td>None given</td>
</tr>
<tr>
<td>Board Director</td>
<td>Understanding</td>
<td>None given</td>
</tr>
</tbody>
</table>
Theme 3 Question 4 (d) Identification mechanisms

Senior managers were asked to describe mechanisms used in their organisations to identify information assets. Identification mechanisms for information assets included: intranets, customer reviews, management meetings, quality systems, staff management, information audits and brainstorming. Identification mechanisms were both formal (databases and management information) and informal (brainstorming and meetings). Customers also drove the identification and exploitation of information assets with customers' needs, demands and increasing involvement with organisations as long-term partners being important factors.

Examples of identification mechanisms include:

"Brainstorming. There will be occasions when we just sit down and try and sort out what we have got, so yes, that sort of thing. But probably not more formal than that. From very, very cut and dried management information through to all sorts of things. So, trying to identify those sorts of information I think a lot of it’s implicit, you know you’ve got these fairly structured or very structured information systems in place and the rest of it just tends to happen and there’s probably a lot just stuck in the middle as well. The spectrum goes right across. And also we mustn’t forget I meet my management team on a monthly basis. The executive meets once a fortnight, so it does value the fact that it does need to structure the organisation across mutually shared information.” Director of Training Strategy, Case study 3.
Barriers to identification also existed:

"No. We have the quality system, but that is a very blunt instrument, that tells you that everything has to be archived for a very long time, but that's just like taking everything in a project and sticking it in a vault somewhere." Lead Consultant 2, Case study 1.

Senior managers in Case study 3 had recognised a lack of identification of information assets as a strategic issue. The organisation had substantial but organically grown information assets and this had resulted in duplication. To address this, an information audit consultant was contracted to interview staff and to create a database of the resources available and being used in the organisation. The thinking behind the decision to conduct an information audit is illustrated by a Senior Manager, Case study 3. The information audit is seen as a starting point rather than a solution showing that identification is seen as not an end in itself:

"I think we're back into the grown organically arena again. Hopefully the information audit will give us a line in the sand that we can build on." Head of Information Systems, Case Study 3.
Theme 3 Question 4 (e) Manage and protect

Many of the managers mentioned IT (Information Technology) security policies and user policies. The management and protection of information assets was seen primarily in terms of IT policies with security issues such as virus protection and data protection of concern. User policies were also frequently reported as mechanisms to protect information assets.

Internal security measures surrounding IT usage predominated:

"We certainly have security policies, in place, around IT. Every employee signs a network usage policy and security policy. We have quality assurance around what we do. So, for example, things like password changes, deletion of users from systems when they leave the business, other things you would expect." IT Director, Case study 2.

The major concerns of senior managers in relation to the protection of information assets were focused not on external risks to the business but on internal risks such as employee abuse. Protection mechanisms were primarily people based with only a few managers mentioning intellectual property rights or patent protection. Two senior managers in Case studies 2 and 3 did show concern about intellectual property rights and patent protection:

"Again that's the other thing that's important, it is our intellectual property, we do have patents, we do have copyrights, on software and all the drawings on all the designs." Technical Manager, Case study 2.

And,

"We are bringing into place a.... e-learning portal and the whole issue of intellectual property rights comes up. Internally the IT systems are very well protected because obviously they are our lifeline to funds." Director of Training Strategy, Case study 3.
Theme 3 Question 4 (f) Replacement cost

As shown in Exhibit 79, five managers said that the replacement cost of information assets was low; three said it was medium and two said it was high. The replacement cost was described in terms of man-hours needed to replace information. A Senior Manager in Case study 2 highlighted the speed with which information could become obsolete by saying that only the previous six months information should be replaced.

However, some 35 senior managers said they did not know the replacement cost.

Exhibit 79. Replacement cost

<table>
<thead>
<tr>
<th></th>
<th>No. of managers</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
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<td>2</td>
<td>35</td>
<td>45</td>
</tr>
</tbody>
</table>

The "do not know" group, which was by far the largest, did give a wide range of reasons why they did not feel comfortable assigning a replacement cost to the information assets which their organisations or they themselves had identified. These reasons illustrate the difficulties faced in assigning a replacement cost to information assets.
Many of the senior managers, who said they did not know the replacement cost, described information assets as irreplaceable because information assets were people based and employees rather than their organisation retained ownership of them:

“Actually replacing some of the information would be very difficult because it’s in people’s heads so lose a person particularly when you know it’s senior people and you automatically will lose a lot of information because it will not be recorded anywhere else within the organisation. The organisation in that sense doesn’t own all the information because it’s never been handed over. The barrier is information is power and status and position and protection. Perhaps if you run into more difficult times the fact you have this information which is very valuable to the company and people have to come to you for it means that you think, some people might think they are less likely to be considered for say redundancy or something. So, there are a lot of issues associated with owning that information in your head. We are all positively individual.” Lead Consultant 3, Case study 1.

And,

“They are all our people, basically because we are very much, I would describe us as a black book organisation. If we lost that person we would lose our business and we have seen that happen. So you know you can translate that to loss of business, a lack of knowledge dissemination equals cost of business unless we have got a solid culture.” Principal Consultant, Case study 1.
And,

"The problem is you couldn't replace it because, well you'd have to throw people at it, because where we are now in the stage in our development we couldn't...it's alright spending 10 years to develop something when you're moving from being a 20 man organisation to a 200 one. When you get to 500 you would have to compress it into a very, very short period of time and it would be incredibly difficult."

Executive Director, Case study 2.

The senior managers' awareness of employees as holders and owners of information assets was interesting. Management attention was focused on the structuring of information assets and sharing using IT but individual employees were recognised as creators, exploiters and owners of important information assets.
Theme 3 Question 4 (f) Level of investment in information assets

Some 14 senior managers said investment in information assets was low, two said it was medium, 25 said it was high and four said they did not know the level of investment (see Exhibit 80).

Exhibit 80. Level of investment

<table>
<thead>
<tr>
<th>Case study</th>
<th>No. of managers</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
<th>Do not know</th>
<th>Total</th>
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<td><strong>Total</strong></td>
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<td><strong>2</strong></td>
<td><strong>25</strong></td>
<td><strong>4</strong></td>
<td><strong>45</strong></td>
</tr>
</tbody>
</table>

Of the 25 senior managers who said that investment was high, investment in traditional information assets such as databases and information systems predominated. Managers were aware that information was more than IT:

"High, in terms of IT yes, but there is more to information than IT."

Programme Manager, Case study 2.

However, when it came to investment, concrete and tangible information assets based in IT systems and strategies were funded rather than less tangible investments such as employee training. In particular, creating customer databases and implementing new financial reporting systems were highlighted as an area for investment:
"The information system is top. Information systems that are key to the company. We invest a lot of money into those products and information systems. Massive investment in information systems."

Engineering Director, Case study 2.

The Engineering Director, Case study 2, also estimated that management were investing 8-10% of his organisation's turnover in information systems.

The funding of infrastructure to deploy information assets was a concern for senior managers in Case study 1, where 10 out of 14 senior managers said that investment in information assets was low:

"The infrastructure to actually use the information effectively is insufficient. The infrastructure to deploy repeatedly that's the problem, we just use it once and throw it away. It's closer to that end than having the information readily stored and then re-managed and re-used, and a lot of what we do could be re-used I believe."

Managing Director, Case study 1.

Financial constraints were reported as a barrier to investment. Although a long-term view of investment in information assets was apparent, financial commitments meant that a balance had to be found:

"The level of investment is what we can afford. It's as simple as that, it's just a fact of life. We would not make the decision to invest in order to increase our profitability in the short-term, we would take a long-term view of this, but you always have to balance these things against shareholders' needs."

Director, Case study 1.
Theme 3 Question 4 (g) Why not identify information assets?

Three managers reported that their organisations had not identified information assets. The reasons they gave were: lack of communication, lack of understanding and lack of awareness:

"Communication I think. I don’t know there are certain things, for example, if you want to start working for a new client, one of the things we do is background checking so that’s obviously recognising important information, but that kind of level of information gathering is invisible to most people and all that information is doing is establishing the company will pay us for the job." Business Manager, Case study 1.

And, lack of understanding:

"Before you could do that you’d have to say to people why it’s important they do it and I don’t think most people would understand, they say, what do you want to do this for? And you’d need to soften people up and position them first. I don’t think that’s happened. Yes, winning hearts and minds, it is saying, you need that to do that, and it’s also saying the slightly more reasonable: why it’s so important to us. It’s easy to talk about intranet and various things but these are only tools at the end of the day or platforms and what do we do with it once we’ve got it?" Head of Human Resources, Case study 3.
Lack of awareness was given as a reason why organisations did not identify information assets even when anecdotal examples suggested that the organisation’s members were benefiting from knowledge-sharing initiatives:

"I don’t think it’s crossed its mind that it needs to. It’s up to individuals to find out what they need and where they can get it, hence the use of the knowledge base in some instances. Even getting people for jobs is difficult, when we were waiting for the old office to be refurbished I was up on one of the other floors and sitting opposite a man who spent much of his time ‘phoning round different offices to find out if a certain type of engineer was available for a certain project at a certain time, without much success. So this gave me an idea for a sort of “body shop” on the intranet pages which has never really come into fruition but the knowledge exchange has been used for that in the past. So that somebody who was with a client up in the north and he worked up in the north they said to him do we have any engineers in this particular field? Because they needed some more work done. He didn’t really know but he ‘phoned up a couple of offices where he knew they had this kind of engineer and drew a blank and he was one of the first people to use the knowledge exchange saying that he’d got this client and needed somebody and within a couple of hours he had three different people from different parts of the company answering him with different engineers on offer.” Manager, Information Resources, Case study 4.

This example shows that providing linkages between people is a key role for this senior manager. The intranet’s role in improving communication is also clear in this particular example.
In Exhibit 81, Human Resources Manager, Case study 1, identifies three Information assets and their associated attributes: Company policies and Accuracy, Recruitment information and Accuracy and Training and Access. Access is also seen as a general attribute of all information assets. The Recruitment information asset raises the issue of the organisation's Knowledge management strategy for this senior manager with the retention of key staff a central concern. The Replacement cost of information assets and Level of investment in them is Low raising the issue of Future economic benefit. Management and protection of information assets has the attribute of Basic information showing that this manager believes that only basic provision has been made.
In Exhibit 82, Process Control Manager, Case study 2 identifies four information assets and three attributes: Product database and Time saving and Access, CAD system, Intranet and Manufacturing database and Delivery. The Intranet is identified as an Identification mechanism for information assets and also as a Management and Protection mechanism. The Replacement cost of information assets and Level of investment in them is high. The Process Control Manager says that Replacement cost cannot equal Value recognising that the Value is far greater. Physical hardware can be replaced but the Lost customers attributable to lost information mean that a Replacement cost for information assets is not a measure of its Value to the organisation.
In Exhibit 83, Training Manager, Case study 3, identifies People management as an information asset with Communication as its attribute. The Level of investment in information assets and their Replacement cost is not known, Replacement cost is seen as having attributes of both Training costs and Recruitment costs connected to an attribute of the Learning curve which new employees must undergo to become effective in the organisation. There is a role for information assets in shortening the Learning curve of new employees and thereby increasing organisational effectiveness. The Learning curve is also therefore an attribute of information assets.
Exhibit 84. Identifying information assets – Director of Software Development – Case study 4

In Exhibit 84, Director of Software Development, Case study 4, identifies the information asset Intranet with attributes of Targeted, Up to date and Intuitive which is also an attribute of Information assets generally. The Intranet is also an Identification mechanism for Information assets and for their Management and Protection, which is the responsibility of the IT department. The Replacement cost and Level of investment in Information assets is High.

Commonalities between Exhibits 81-84

Senior managers in two of the case study organisations (Exhibits 81 and 82) identified Access as an important factor in identifying information assets. Recruitment and Recruitment costs (Exhibits 81 and 83) representing unnecessary costs to the organisation were also given as reason for identifying information assets.
6.3.4 Theme 4: Non-routine decision
Senior managers were asked to provide examples of non-routine decisions they had made in the previous few months at work. Non-routine decisions made varied from people management issues to the formulation of company car policies. Some examples of the non-routine decisions made were:

Lead Consultant 1 – Case study 1
The non-routine decision taken by Lead Consultant 1 was a marketing decision. A new marketing campaign was not “bearing the fruits that I expected it to be”. He concluded that “we were targeting the wrong people” and that there was a need to refocus the campaign.

Engineering Director – Case study 2
The non-routine decision taken by Engineering Director was to look at contract performance. Whilst winning contracts was very much the recognised measure of success for the organisation, the Engineering Director took a pragmatic view “it’s very important that we step back and see how profitable that contract is… it’s very important that we actually review the performance of that contract so when we embark on the next contract we learnt from our losses.” He concluded that information regarding key areas such as manufacturing times were “poor” and required a refocus on inputs to the business systems in the organisation.

Head of Information Systems – Case study 3
The non-routine decision taken by Head of Information Systems was to discontinue shift working in the IT Department. This affected two staff, reducing their wages by approximately 20%. It also meant that more forward planning was needed so that work that had been carried out overnight could be included within a normal working day. She concluded that “we decided in the end that we wouldn’t continue shift working.”
Director – Business Unit – Case study 4

The non-routine decision taken by Director – Business Unit involved the opening of a new regional office for a group of people working on a project. The decision involved not only the acquiring of new premises but a commitment to building up a team which could win and carry out further work. The project team could have been accommodated within an existing regional office but the creation of a new office demonstrated a strategic and long-term commitment to both the team and its work. He concluded that it was important to get the “team built up.”
Theme 4 Question 5 (a) Categories used and liked

The senior managers were asked to describe the categories of information they used to make their non-routine decisions and to describe any categories they might have found useful had they been available. The term "categories" was used to allow senior managers who did not necessarily view information as an asset to describe important information used for decision-making in their organisations. In the event, no senior managers objected to a definition of information as an asset. The categories of information used and liked do provide an insight into the difficulties faced by senior managers in accessing information assets of a suitable quality for decision-making.

Lead Consultant 1 – Case study 1 – Marketing decision

The lack of any sales revenue from the marketing initiative was the category of information used by the Lead Consultant:

"It was basically the fact that we hadn't got any sales."

The categories of information that he would have liked to have used were related to the targeting of the marketing initiative, in particular, information on customers' needs.

Engineering Director – Case study 2 – Contract performance

The Engineering Director explained that information used for his decision was data collected by means of operatives using swipe cards. This information was not reliable since one man could operate two or three machines but his time would only be allocated to one of them. This made it difficult to identify what costs were involved in discrete contracts.

"So the one job gets all the time allocated to it and the other two get nothing allocated to them so the information going into the business systems is not accurate."
The categories of information he would have liked to have used were information on what products were not being produced “profitably”.

Head of Information Systems – Case study 3 – Discontinue shift working
The information used by the Head of Information Systems was primarily financial information and human resources information. There was also some research into the technology of automating back-ups so that hands on work would no longer be required. There were no other categories of information that she would have liked to have used.

Director – Business Unit – Case study 4 – Open a new regional office
The Director of the Business Unit stated that the decision was:

“based virtually wholly on staff issues. The knowledge that we could build up a team of people there and if we didn’t have one there that we could lose the potential.”

He identified a range of information assets he would have liked to have had access to including: business opportunities in the regional area, access to the wider organisation in order to identify anyone else keen to have a presence in the region. This was described as “market intelligence but also internal market intelligence to make the decision stronger”.

The non-routine decisions made also highlighted senior managers’ concerns over lack of quality and utility of information assets in their organisations.

“Because it’s brought it home to me that we really do need to do it better because it would have made life easier. I’m sure there are other parts of the organisation where information could be better. I think it’s well known in the organisation, including my staff, that customer databases are not as good as they ought to be. And they are huge, substantial databases.” Board Secretary, Case study 3.
Theme 4 Question 5 (c) Decision success or not

A total of 30 senior managers said that the non-routine decisions they had made were a success justifying their view with comments such as:

"We won the competition and the contract has been awarded."
Lead Consultant 2, Case study 1.

Sometimes, success brought interest from colleagues:

"It has been a success, it's achieved what I wanted out of it for my particular need and since then two or three other business units have come on board. They've seen it and said, "Ah, I'm interested now", you say, "I thought you weren't interested before". It's the cart before the horse." Director, Business Unit, Case study 4.

Fifteen senior managers said that the outcomes of their decisions were not known. Usually this was related to a non-routine decision which they had taken very recently. For example, in the "Review Marketing Decision" where a review of a marketing initiative was undertaken when sales revenue failed to materialise, the senior manager commented:

"Too early to tell. We've been going a couple of months. There's a bit of interest, but I wouldn't say it's successful yet." Lead Consultant 1, Case study 1.
Perhaps not surprisingly, none of the senior managers said their decision was not a success, although one manager did say that his team had made the right decision but that it had resulted in the wrong outcome:

“It was the right decision with the wrong outcome. We made the right decisions, it happens the outcome wasn’t what we wanted, but it wasn’t the fault of our decision-making.” Managing Director, Case study 1.

The conclusion to be drawn might be that the senior managers interviewed were experienced enough in their work to make successful non-routine decisions without necessarily using information assets. This has implications for decision-makers with less experience, be they new employees or newly-promoted senior managers.
Theme 4 Question 5 (d) Decision and perception

Had information assets been instrumental in making a non-routine decision it was thought that this might impact on the senior managers’ perceptions of the value of the information asset used. However, non-routine decisions, even successful ones, did not seem to change the perceptions of the value of information assets for many managers. Senior managers recognised that there were underlying problems in their organisations which information assets and their management could address. However, directing management attention towards these was a matter of priorities. As long as the organisation was effective at the macro level, the micro level was not addressed:

“It’s not changed because we know about our problems….the problem in the business is that we’ve got that many ideas and we know our problems: it’s all about prioritising, and up to this last quarter we’ve had other priorities, because at the macro level it’s working. If it didn’t work at the macro level then yes, we’d then sort the micro level out, but because it’s working at the macro level then it’s pretty much ok, but it can get better.” Engineering Director, Case study 2.
6.3.4.1 ATLAS/Ti Analysis: Theme 4: Non-routine decision

Exhibit 85 shows a non-routine decision concerning whether to make a bid for a contract taken by Lead Consultant 1 – Case study 1.

Exhibit 85. Non routine decision – Lead Consultant 1 – Case study 1

In Exhibit 85, Management attention has a part relationship with Bid for contract as this issue engages management in resourcing and decision-making activities which require their attention. Management attention is a concept which linked across many issues so that it eventually emerged as an important category.

As can be seen in Exhibit 85, the cost of the bidding process was mentioned in both Categories used and Categories liked. Cost is therefore identified as an information asset and linked to Decision and Perception. Assessing whether a bid was Cost-effective was seen to be a part of Competitive advantage, a concept that again emerged across many issues raised and was identified as an important category. The senior manager’s main concern in this example was
maintaining Competitive advantage by controlling the Cost of the contract bid. More cost information was required (especially the cost information of competitors) but this would have been very difficult if not impossible to access. Two results are also shown. The result of the non-routine decision was a Winning bid. However, the senior manager's perception of the information he used to make this decision remained Unchanged.
The non-routine decision taken by Technical Manager, Case study 2, involved the Recruitment of a specialist external contract engineer in a field which his organisation was considering entering. A Recruitment decision attracts Management attention shown by a part relationship. The Categories of information used were the Internet to check out competitors’ current projects to identify suitable candidates and his own Specialist knowledge of transferable skills in the industry. The Categories of information he would have liked to have used was Knowledge of the extent to which contract engineers had access to or could provide Copyrighted information. The decision was a success, a suitable candidate was identified and recruited and the success did make a difference to the manager’s Perception of the Value of the information he used. In particular, he identified Competitive advantage as an issued related to Specialist knowledge and this has a part relationship with making a difference to his perception of the value of the information used.
In Exhibit 87, the non-routine decision taken by Head of Policy, Case study 3, involves the use of Performance measures in his organisation. The Categories of information used are Financial information and Supervisory Training. The number of managers in the organisation taking up opportunities for Supervisory training has an impact on the Financial results of the organisation as these two variables are connected in the business plan. The Categories of information he would have liked to have used was Monitoring information from local staff of training uptake. Financial information in the organisation determines Management attention which has a part relationship with Performance measures and the Reuse of information. The outcome of the decision is not known. The decision has changed the Perception of the Head of Policy of the Value of the information used. He is much more aware of opportunities to reuse information which are being lost.
Exhibit 88. Non-routine decision - Senior Manager - Case study 4

In Exhibit 88, the non-routine decision taken by Senior Manager, Case study 4, involves choosing an Advertising vehicle for the organisation which was part of Management attention. The Categories of information used were Basic information on what advertising routes were available. The Categories liked would have been much more Detailed information on what would be eye-catching for particular audiences. He saw this as part of gaining Competitive advantage. The outcome of the decision was not known, but the manager did say that the decision had changed his Perception of the Value of the information used. He saw the use of information as resulting in Innovation raising the issue of Competitive advantage.

Commonalities between Exhibits 85-88
Competitive advantage was identified as an important factor by three senior managers (Exhibits 85, 86 and 88) when making non-routine decisions.
6.3.5 Theme 5: Measuring the effects of information assets

Theme 5 Question 6 (a) Measure the effects of information assets

Exhibit 89. Measure the effects of information assets

<table>
<thead>
<tr>
<th></th>
<th>No. of managers</th>
<th>Yes</th>
<th>No</th>
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<td><strong>34</strong></td>
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</table>

A total of 11 senior managers said their organisations measured the contribution which information assets made to the business whereas 34 managers said their organisations did not attempt measurement, as shown in Exhibit 89.
Theme 5 Question 6 (b) How is measurement achieved?

The measurement of information assets and their attributes was described almost exclusively in terms of cost and time-saving. Measures in place were whole business measures, for example:

"I think they do to the extent that the whole investment is being measured but I don't think there is a separate measure for the value of information assets. I think it's a value of the product and that is a combination of a number of things including the hardware, the software and the information itself, so we measure the combination rather than individually." Director, Corporate Services, Case study 4.

And, operational measures:

"The only real measure that's important is again the operational performance measures like more business, more sales, better project management, on-time delivery, cost of delivery. Those are the real tangible things that people will be looking for, now there is a million and one ways to measure those." Principal Consultant, Case study 1.

And, accumulation measures:

"Measure how much extra information is put in." Director of Technical Consulting, Case study 1.
Many of the senior managers saw measuring the contribution information made as “pointless”. The impact of information on the business in terms of improvement was seen as being of more importance.

“I’m not sure I want to measure it to be honest. I think it needs to be recognised that it needs to be valued, but measuring it, unless it’s measuring performance improvement with the use of that information, measuring its value per se I think is pointless. Looking for a constant performance improvement, goes back to one of your earlier questions, I think that’s important, but I think measuring its value no.” Senior Manager, Case study 4.

Measuring the value of information assets would not provide senior managers with any more reassurance that improvements were being made. Rather, information assets and their measurement appeared to be best situated within a holistic and strategic view of the organisation.
Theme 5 Question 6 (c) Suggested measures

Suggested measures for the contribution which information assets made to their business were operational measures such as number of hits into information and team performance measurement:

"Yes, you could do it like a web-site, do hits into certain sets of information." Director of Technical Consulting, Case study 1.

And,

"I think you could measure, thinking about the way, or what I do with contracts, you could maybe correlate what areas are responsible for each management team, team leaders as well. If you look at audits and claw-backs for not doing the job you could maybe do some sort of correlation between where a management team’s been in place for a while and they all understand the information that they’re working with, how they perform in relation to an area that’s had a completely new management team who are still getting to grips with everything and look at the delivery, the claw-backs on the process and audit trails and was that good audits or bad audits? Success rates, and that goes for re-assessed ones too, we have one area that one person had been quite successful with it but the person dealing with it has been around for a while and has a lot of ideas down on paper but you’ve got other teams that are struggling.” Training Manager, Case study 3.

Senior managers in Case study 3 said that there was a long learning curve involved in their joining the organisation and saw good quality information assets and universal access to them as a tool to shorten the learning curve for new employees.
Similarly, the role of people in managing information outweighed the issue of measurement:

“Well, I think there’s been an acknowledgement that there is a need for the information now. I don’t think there’s a measure of the effectiveness of the information except for collecting information and having a strategy of how we do business. The strategy is there and one will look back and be able to see the value has been in being able to get success in those things but I don’t think there’s anything that measures it but at least we acknowledge it, we realise that it enables different things to occur. Of course you need a lot more than the information to do it, it’s people to harness it then do something with it but I think the acknowledgement of the fact that it’s important is there and that we value it.” Managing Director, Business Development, Case study 4.
In Exhibit 90, Executive Director, Case study 1, identifies Development and Growth of the organisation as key measures. These measures determine Organisational effectiveness which he sees as part of Competitive advantage and Growth. Measures also relate to Future economic benefit and result in Growth and Competitive advantage.
In Exhibit 91, Marketing Manager, Case study 2, identifies Resource information and Growth as key measures for his organisation. These measures determine Organisational effectiveness and are related to Future economic benefit. Future economic benefit results in Growth and in a recognition of the Importance of information.
In Exhibit 92, Head of Policy, Case study 3, identifies measures of Customer involvement and Employee satisfaction survey as key measures. The Employee survey has an impact on Organisational effectiveness since employees are involved with customers and their satisfaction with the organisation is related to the effectiveness of the organisation. Customer involvement results from Future economic benefit which relates to the Measures identified.
In Exhibit 93, Divisional Director, Case study 4, identifies the overall financial results of the organisation as useful measures. Measures relate to Future economic benefit for the organisation which is seen as having a part relationship with Risk analysis, meaning that risks to the business have to be identified to result in success. Organisational effectiveness determines which Measures are important and are related to the Overall financial results of the organisation.

Commonalities between Exhibits 90-93
Future economic benefit was identified by all of the four senior managers as an important issue when measuring the effects of information assets. Growth also appeared to be an important factor (Exhibits 90 and 91) which was identified across individual case study organisational boundaries.
Theme 5 Question 6 (d) Importance of information in next five years

Exhibit 94. Next five years

<table>
<thead>
<tr>
<th></th>
<th>No. of managers</th>
<th>More important</th>
<th>Less important</th>
<th>Unchanged</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case study 1</td>
<td>14</td>
<td>14</td>
<td>0</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>Case study 2</td>
<td>9</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Case study 3</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Case study 4</td>
<td>12</td>
<td>11</td>
<td>0</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>44</td>
<td>0</td>
<td>1</td>
<td>45</td>
</tr>
</tbody>
</table>

Some 44 managers said they thought the identification and management of information assets would become more important over the next five years (as shown in Exhibit 94). One manager (Case study 4) said it would remain unchanged because in his organisation:

"The culture needs to change and I'm not in charge of that. If you want my opinion, I would say it won't change. At worst it might deteriorate because I don't really think the people at the top have got their eye on the ball, if you like, they've got bigger fish to fry, more important things to do. I suppose as I say, if you change the strategy of a company and reorganise the spin-offs from that in terms of management, you've got to change things. Hopefully there's time, they might realise that OK they've made all these changes but people need information to make decisions, to do their jobs." Marketing Information Systems Manager, Case study 4.
Senior managers saw information assets becoming more important in terms of better recognition, competitive advantage and growth leading to increased need for formal communication mechanisms:

“...I think it will become more important, it's clearly recognised, we're updating our financials system, we're looking at contact management systems, we're looking at internal communications. Certainly it is recognised and the senior people in the company do recognise the importance of that.” Lead Consultant 1, Case study 1.

And,

“...It will actually determine who will survive and who will fail commercially, because information gives you competitive advantage”. Lead Consultant, Case study 1.

And,

“...Growth of the group means that informal systems of communication of information are no longer going to be robust and efficient enough to cope.” Financial Controller, Case study 2.
The importance of information assets over the next five years was seen in both positive and negative ways by the senior managers interviewed. On the one hand, information could be harnessed to improve communication and relationships with customers. On the other hand, more information required more management attention to ensure it was maintained and managed well and to avoid information overload:

“And we're all more swamped by information now so the ability to keep your head around everything that comes to you these days is important, it is not possible to manage it all yourself.” Managing Director – Business Development, Case study 4.
6.4 **ATLAS/Ti Categories**

Textual analysis of the 45 interviews with senior managers in the four case study organisations was undertaken using ATLAS/Ti. The steps undertaken during the coding and analysis have been detailed in Chapter 4. The analysis was essentially a grounded theory approach where a process of familiarisation and categorisation was undertaken. The networks used to illustrate Chapter 6 show the many relationships that linked the data, providing a rich view.

The final step of the ATLAS/Ti analysis involves the building of broad categories which can then be used to form a theory. These broad categories encapsulate the major themes found to be important in the analysis. The categories are formed by a sorting process. Concepts that have been coded frequently build up "groundedness" in the data. Concepts can be sorted by groundedness so that those codes that have been coded most frequently can be brought together. Groundedness is represented by the first number in the brackets shown below. The first 20 codes by groundedness are shown.

**Codes sorted by groundedness (20)**

- Information assets {113-178}
- Management attention {75-191}
- Sharing information {56-6}
- Customer involvement {50-38}
- People management {44-29}
- Improvement {40-14}
- Information strategy {38-3}
- Competitive advantage {29-61}
- Access {28-14}
- Cost {28-12}
- Recognition {24-6}
- Knowledge {22-17}
- Financial information {22-16}
- Quality {21-10}
- Communication {21-7}
- Individuals {21-8}
- Intranet {20-21}
- Development {17-9}
- Accuracy {16-15}
- Risk analysis {4-15}
The number of relationships between codes, i.e. the linkages between them shown in the networks is known as their density and is shown by the second number in brackets.

**Codes sorted by density (10)**

- Management attention (75-191)
- Information assets (113-178)
- Competitive advantage (29-61)
- Customer involvement (50-38)
- People management (44-29)
- Intranet (20-21)
- Knowledge (22-17)
- Financial information (22-16)
- Accuracy (16-15)
- Risk analysis (4-15)

Concepts that have a high level of both groundedness and density can be seen to be important and used to build theory.
6.5 **Summary**

Information asset-scoring grids

- Findings for the information asset-scoring grid identified Customer information and Management information as the most important information assets and quality as the most important attribute for the senior managers.
- The restructuring of organisations into separate business groups was identified as a barrier to information sharing.

Open-ended guided interviews

- Information strategy was described as poor by senior managers in Case studies 1 and 4 and as good or exceptional by senior managers in Case studies 2 and 3.
- The value of information was discussed at management meetings with the reuse of information, especially project-based information, an important issue.
- Difficulty in quantifying a value for information as identified in the literature (Reuters, 1995, p.5) was given as a reason for not placing a monetary value on information showing that this remains an issue today.
- Discriminating between different information assets by ranking them did not feature as an alternative to the discussion of information value with only 12 senior managers saying they attempted to rank the value of information assets.
- Senior managers who said their organisations were effective gave reasons such as "improved access to corporate experience" and "leveraging of that experience".
Senior managers who said their organisations were becoming ineffective gave reasons such as an inability “to keep up with the pace of change”.

Many senior managers in the four case study organisations defined organisational effectiveness in terms of external effectiveness, e.g. customer satisfaction, delivery of product and services and quality of product and services. Senior managers in Case study 1 and 2 also defined organisational effectiveness in terms of internal effectiveness such as improved decision-making.

The role of information assets in enhancing organisational effectiveness was described as improving communication, identifying hoarders (non-sharers) of information assets and enhancing decision-making, essentially internally-focused roles.

A wide range of information assets were identified. Customer information was identified as an important information asset by senior managers in all four case study organisations. People management was identified as an important asset by Case study 3. Quality and utility were identified as important attributes of information assets. Employees were seen as creators, exploiters and owners of information assets.

Both formal and informal mechanisms for identification of information assets were described.

Management and protection of information assets was primarily security focused, e.g. preventing misuse of IT by employees. Some recognition of intellectual property rights demonstrated in Case studies 2 and 3.
• Good awareness of issues surrounding cost of replacing information assets. Only a few senior managers said that information assets could be replaced demonstrating awareness that cost does not equal value.

• Level of investment in information assets was described as high by 25 of 45 senior managers. Investment in IT systems predominated, for example, purchasing financial management systems.

• Reasons given for not identifying information assets were: lack of communication, lack of understanding and lack of awareness within the organisation sometimes in the face of strong anecdotal evidence that information assets were adding value.

• Non-routine decisions made using information assets were varied ranging from people management issues to policy decisions.

• Senior managers used a range of information assets to make non-routine decisions. A range of information assets were identified but many of these were basic information assets that could or should have been available again highlighting issues of quality and access.

• Senior managers either judged their non-routine decision to be a success or said that the outcome was not yet known. The use of information assets to make non-routine decisions did not appear to impact on many senior managers' perceptions of their value.

• Measurement of the effects of attributes of information assets, where it occurred, focused on cost and time saving measures. Traditional measures were recognised as limited with a focus on the impact of information, for example, in terms of business improvement, being seen as a more important indication of value.
Suggested measures for the effects of attributes of information assets were again focused on cost and time saving measures. There was recognition that information had a role in improving organisational effectiveness in, for example, shortening the learning curve of new employees, which outweighed issues of measurement.

The identification and management of information assets was seen as becoming of more importance over the next five years. A variety of reasons was given, including survival, coping with growth and ensuing communication problems, and coping with information overload.

Competitive advantage, Information assets, Customer involvement and Management attention emerged as central categories having high levels of both groundedness and density. Individual ATLAS/Ti categories for each case study organisation will be discussed in Chapter 6a. These categories will be used to explore a grounded theory of information assets in Chapter 7.

6.6 Conclusion

The four case studies revealed a practical and focused approach to information assets and their management that was consistent with the findings of the preliminary research. Customer information assets were identified by senior managers as critical to their businesses. People management was also an important information asset, reflecting a growing understanding of the role of employees as owners and managers of information. Attributes of information assets identified were again wide and varied, the focus was on practical issues of quality and utility rather than impact or economic benefits of information assets. This was not to say that such benefits were not recognised or indeed sought, rather, the role of information assets and their attributes in underpinning value creating activities was foremost.
CHAPTER 6a

6a. REVIEW OF CASE STUDIES

This chapter provides a review of the four case studies conducted. Section 6a.1 provides the introduction and describes the purpose of the case study review, that is, to discover any similarities or differences between the four case studies.

Section 6a.2 provides a review of Case study 1 giving information asset and attributes ATLAS/Ti codes sorted by groundedness and density.

Section 6a.3 provides a review of Case study 2 giving information asset and attributes ATLAS/Ti codes sorted by groundedness and density.

Section 6a.4 provides a review of Case study 3 giving information asset and attributes ATLAS/Ti codes sorted by groundedness and density.

Section 6a.5 provides a review of Case study 4 giving information asset and attributes ATLAS/Ti codes sorted by groundedness and density.

Section 6a.6 discusses any similarities and differences found between the four case study organisations.

The chapter concludes with a Summary, Section 6a.7 and Conclusion, Section 6a.8.
6a.1 Introduction

The case study evidence is developed for each case study organisation. Individual ATLAS/Ti codes for groundedness and density are generated for each case study organisation and these are examined in order to ascertain whether any similarities or differences can be identified between the four case study organisations. Of the four case studies, conducted between late 2001 and early 2002, three were private (corporate) organisations, Case studies 1, 2 and 4, and one was a large public sector organisation, Case study 3. Grounded theories for each case study organisation are presented and the overall pattern of evidence is examined, again with the aim of identifying any similarities or differences.
6a.2 Case study 1

Case study 1 was based in the south of England. The organisation provided consultancy services in a specialist industry area and had undergone a management buy-out and restructuring in recent years. The organisation was well-established in its field and employed some of the leading consultants in its industry, indicating a high level of corporate expertise.

In the information asset-scoring grid exercise, Customer information, Product information and Organisational information "Culture" were the most highly scored information assets for Case study 1. The quality of such information assets was an important concern. A total of 14 senior managers were also interviewed for the case study. The organisation had identified the management of data, information and knowledge as key areas. However, the managers interviewed saw the organisation's current information handling and use as poor. Despite this, there was a good awareness among managers of the issues involved in managing information and in creating usable and accessible information stores, which were protected and managed adequately. Information asset development was, however, hampered by a lack of information systems and infrastructure on which to base value added information policies.

During the interviews, many managers highlighted concerns with the effectiveness of the project planning and bidding process through which their organisation gained new customers. Project teams working on creating and pricing bids often duplicated or could not find relevant information resulting in time and effort being expended needlessly. In particular, the project managers said that duplication of work and inaccessibility of useful and relevant information was a major problem. In many cases, project information and reports were being archived, and so were not quickly accessible to those who needed them. It was proposed by one manager that security and access issues were often used to hide problems with delivering and accessing these types of information.
Communication, especially using the organisation's intranet, was also ineffective. The managers interviewed saw the organisation's communication as poor and overly reliant on the intranet and email. There was a lack of face to face interaction; one manager identified a monthly briefing by a senior manager as the model on which he would like to proceed. More physical team meetings and briefings were seen as useful. The managers also identified competitor information and customer contact information as key areas for the organisation that were not adequately dealt with through the intranet.

Information assets identified were traditional assets which might be viewed as containers or enablers of information management. These included a new series of databases including a customer contact system and accounting system with built in forecasting and time allocation modelling. Attributes were described in terms of ensuring timeliness, quality and accuracy of information. Investment and management attention given to these types of information assets was good. They were perceived as having a short-term benefit. Non-physical or intangible types of information assets were also used as examples; with managers giving "relevant experience" and "reuse knowledge" as important information assets (see Exhibit 75). This showed that the managers were aware of the many years' of specialist experience and knowledge represented in themselves and their staff but they were unsure how to effectively harness it.
ATLAS/Ti Analysis

The interviews conducted with the 14 senior managers in Case study 1 were analysed using the specialist software ATLAS/Ti. Using ATLAS/Ti, unique codes are created for each interview which are either associated with text or can be created freely. Codes that are not associated with any text are shown with an associated number 0-0. Codes associated with one text are shown by 1-0 and so on. As the number of associations with text builds up, the code starts to take on a level of groundedness in the data. The second part of the associated number 1-0 refers to its degree. This is the number of relationships between the code and other codes so that one relationship would be shown as 1-1. This is the level of density of the code in the data, the number of important relationships and linkages with other codes. A high level of groundedness (indicated by the number to the left (29-46) which shows the number of times a concept has been coded) indicates the importance of issues frequently raised. The first 20 codes with a high level of groundedness for Case study I are shown in Exhibit 95:

Exhibit 95. Case study 1 codes sorted by groundedness

<table>
<thead>
<tr>
<th>No.</th>
<th>Codes</th>
<th>Sorted by groundedness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Information assets</td>
<td>(33-53)</td>
</tr>
<tr>
<td>2</td>
<td>Management attention</td>
<td>(20-55)</td>
</tr>
<tr>
<td>3</td>
<td>Sharing information</td>
<td>(16-1)</td>
</tr>
<tr>
<td>4</td>
<td>Customer involvement</td>
<td>(16-12)</td>
</tr>
<tr>
<td>5</td>
<td>Improvement</td>
<td>(13-3)</td>
</tr>
<tr>
<td>6</td>
<td>Information strategy</td>
<td>(11-1)</td>
</tr>
<tr>
<td>7</td>
<td>Competitive advantage</td>
<td>(10-17)</td>
</tr>
<tr>
<td>8</td>
<td>Access</td>
<td>(10-3)</td>
</tr>
<tr>
<td>9</td>
<td>Communication</td>
<td>(9-1)</td>
</tr>
<tr>
<td>10</td>
<td>Cost</td>
<td>(8-3)</td>
</tr>
<tr>
<td>11</td>
<td>Intranet</td>
<td>(8-7)</td>
</tr>
<tr>
<td>12</td>
<td>Recognition</td>
<td>(7-1)</td>
</tr>
<tr>
<td>13</td>
<td>Financial information</td>
<td>(7-5)</td>
</tr>
<tr>
<td>14</td>
<td>Quality</td>
<td>(7-2)</td>
</tr>
<tr>
<td>15</td>
<td>Knowledge</td>
<td>(6-5)</td>
</tr>
<tr>
<td>16</td>
<td>Individuals</td>
<td>(5-2)</td>
</tr>
<tr>
<td>17</td>
<td>People management</td>
<td>(4-6)</td>
</tr>
<tr>
<td>18</td>
<td>Accuracy</td>
<td>(4-3)</td>
</tr>
<tr>
<td>19</td>
<td>Development</td>
<td>(4-2)</td>
</tr>
<tr>
<td>20</td>
<td>Risk analysis</td>
<td>(1-3)</td>
</tr>
</tbody>
</table>
The number of relationships between codes, i.e. the linkages between them, is known as their density (indicated by the number to the right (29-46) which shows the number of times a concept has been linked with other concepts). The first 10 codes with a high level of density are shown in Exhibit 96:

Exhibit 96. Case study 1 codes sorted by density

<table>
<thead>
<tr>
<th>No.</th>
<th>Codes</th>
<th>Sorted by density</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Management attention</td>
<td>(20-55)</td>
</tr>
<tr>
<td>2</td>
<td>Information assets</td>
<td>(33-53)</td>
</tr>
<tr>
<td>3</td>
<td>Competitive advantage</td>
<td>(10-17)</td>
</tr>
<tr>
<td>4</td>
<td>Customer involvement</td>
<td>(16-12)</td>
</tr>
<tr>
<td>5</td>
<td>Intranet</td>
<td>(8-7)</td>
</tr>
<tr>
<td>6</td>
<td>Knowledge</td>
<td>(6-5)</td>
</tr>
<tr>
<td>7</td>
<td>People management</td>
<td>(4-6)</td>
</tr>
<tr>
<td>8</td>
<td>Financial information</td>
<td>(7-5)</td>
</tr>
<tr>
<td>9</td>
<td>Accuracy</td>
<td>(4-3)</td>
</tr>
<tr>
<td>10</td>
<td>Risk analysis</td>
<td>(1-3)</td>
</tr>
</tbody>
</table>

Codes with both a high level of groundedness and a high level of density can be identified as meaningful (see Exhibit 97) and used to create a model for this case study.

Exhibit 97. Case study 1 codes sorted by groundedness and density

<table>
<thead>
<tr>
<th>Codes</th>
<th>Sorted by groundedness and density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management attention</td>
<td>(20-55)</td>
</tr>
<tr>
<td>Information assets</td>
<td>(33-53)</td>
</tr>
<tr>
<td>Competitive advantage</td>
<td>(10-17)</td>
</tr>
<tr>
<td>Customer involvement</td>
<td>(16-12)</td>
</tr>
<tr>
<td>Intranet</td>
<td>(8-7)</td>
</tr>
<tr>
<td>Knowledge</td>
<td>(6-5)</td>
</tr>
</tbody>
</table>
In Exhibit 98, Management attention is directed toward Competitive advantage with the achievement of Competitive advantage enabled through Customer involvement. Information assets are receiving Management attention, however, concern is focused on assets such as the Intranet. Management is aware of issues surrounding loss of Knowledge and duplication of effort impacting on organisational effectiveness but currently have no strategies to deal with this.

A grounded theory for Case study 1 is proposed:

Management attention is focused on gaining Competitive advantage through Customer involvement. Knowledge management strategies are lacking which adversely affects long term effectiveness.

Recommendation
Case study 1 could implement strategies to improve access to, and management of, information. In particular, strategies need to be developed to provide for better management of the project bidding and planning process and to capture and reuse the expert knowledge generated during these processes.
6a.3 Case study 2

Case study 2 was based in the Midlands. The organisation was traditionally based within the engineering industry but had cultivated leading edge Internet and ICT technology to provide a competitive edge at an international level.

In the information asset scoring grid exercise Customer information, Competitor information and Business processes were the most highly scored information assets for Case study 2. The quality and utility of such information assets was an important concern.

A total of nine senior managers were also interviewed. As a growing organisation with a strong leadership ethos the organisation was well placed to cultivate technological innovations. Less successful were information focused activities aimed at capturing corporate expertise and knowledge. In particular, attempts to introduce an electronic library for organisational documents proved unsuccessful. The information technology department had been successful in creating knowledge bases from existing documents and capturing technical expertise but seemed to have applied this approach unsuccessfully to the implementation of an electronic library. Use of the electronic library was limited to a small number of employees and it had not become the collaborative tool that was envisaged.

A great deal of effort had also been expended in making information assets available to a multiple user group on an international level, and there was a high level of in-house expertise. Many of these information assets comprised specialist industrial product information and may be unique assets for the organisation. There were, however, difficulties encountered in capturing the less tangible and transferable knowledge of the organisation’s employees within such structured systems.

In interviews with the nine senior managers in Case study 2, the management and application of information technology to the business, especially through use of the Internet was raised. There was a great deal of emphasis on creating
structured customer databases and information systems to enable competitive advantage in a technically demanding product area. The IT budget was described as “unlimited”. Many of the databases and systems developed showed a clear focus on delivering customer focused solutions. Providing access for customers and suppliers over an international network was a priority.

Exceptional growth of the organisation also meant that methods and initiatives developed locally needed to be communicated in a much wider variety of operating environments. Continuous business improvement and growth was seen as particularly difficult to communicate in a multi-cultural and multi-lingual business environment. However, it was a new financial reporting system that was cited as the most promising initiative in building the business as it would provide management with critical information for business development.

Many of the managers reported using specific information assets to make decisions indicating high use of existing information assets. They also said they were aware of the importance of measuring information assets. Current measurement was indirect, evolving from man-hour saving models used throughout the organisation. Suggestions for measures included hit rates on the web site and the introduction of critical success factors and key performance indicators. One manager said that the “key to measurement was recognition of how critical information assets are”.

The organisation’s major focus seems to have been on the development of information technology solutions to outstrip the capabilities of their rivals and open up market opportunities on a European and International level.
ATLAS/Ti Analysis

The interviews conducted with the nine senior managers in Case study 2 were analysed using the specialist software ATLAS/Ti. Using ATLAS/Ti, unique codes are created for each interview which are either associated with text or can be created freely. Codes that are not associated with any text are shown with an associated number 0-0. Codes associated with one text are shown by 1-0 and so on. As the number of associations with text builds up, the code starts to take on a level of groundedness in the data. The second part of the associated number 1-0 refers to its degree. This is the number of relationships between the code and other codes so that one relationship would be shown as 1-1. This is the level of density of the code in the data, the number of important relationships and linkages with other codes. A high level of groundedness (indicated by the number to the left (29-46) which shows the number of times a concept has been coded) indicates the importance of issues frequently raised. The first 20 codes with a high level of groundedness for Case study 2 are shown in Exhibit 99:

Exhibit 99. Case study 2 codes sorted by groundedness

<table>
<thead>
<tr>
<th>No.</th>
<th>Codes</th>
<th>Sorted by groundedness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Information assets</td>
<td>(26-39)</td>
</tr>
<tr>
<td>2</td>
<td>Management attention</td>
<td>(19-44)</td>
</tr>
<tr>
<td>3</td>
<td>Sharing information</td>
<td>(14-1)</td>
</tr>
<tr>
<td>4</td>
<td>Customer involvement</td>
<td>(12-10)</td>
</tr>
<tr>
<td>5</td>
<td>Improvement</td>
<td>(8-3)</td>
</tr>
<tr>
<td>6</td>
<td>Information strategy</td>
<td>(8-1)</td>
</tr>
<tr>
<td>7</td>
<td>People management</td>
<td>(7-4)</td>
</tr>
<tr>
<td>8</td>
<td>Competitive advantage</td>
<td>(6-14)</td>
</tr>
<tr>
<td>9</td>
<td>Access</td>
<td>(6-3)</td>
</tr>
<tr>
<td>10</td>
<td>Cost</td>
<td>(6-3)</td>
</tr>
<tr>
<td>11</td>
<td>Knowledge</td>
<td>(6-3)</td>
</tr>
<tr>
<td>12</td>
<td>Recognition</td>
<td>(6-1)</td>
</tr>
<tr>
<td>13</td>
<td>Financial information</td>
<td>(5-4)</td>
</tr>
<tr>
<td>14</td>
<td>Individuals</td>
<td>(5-2)</td>
</tr>
<tr>
<td>15</td>
<td>Development</td>
<td>(5-2)</td>
</tr>
<tr>
<td>16</td>
<td>Accuracy</td>
<td>(4-3)</td>
</tr>
<tr>
<td>17</td>
<td>Quality</td>
<td>(4-2)</td>
</tr>
<tr>
<td>18</td>
<td>Communication</td>
<td>(3-1)</td>
</tr>
<tr>
<td>19</td>
<td>Intranet</td>
<td>(2-3)</td>
</tr>
<tr>
<td>20</td>
<td>Risk analysis</td>
<td>(1-3)</td>
</tr>
</tbody>
</table>
The number of relationships between codes, i.e. the linkages between them, is known as their density (indicated by the number to the right (29-46) which shows the number of times a concept has been linked with other concepts).

The first 10 codes with a high level of density are shown in Exhibit 100:

**Exhibit 100. Case study 2 codes sorted by density**

<table>
<thead>
<tr>
<th>No.</th>
<th>Codes</th>
<th>Sorted by density</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Management attention</td>
<td>(19-44)</td>
</tr>
<tr>
<td>2</td>
<td>Information assets</td>
<td>(26-39)</td>
</tr>
<tr>
<td>3</td>
<td>Competitive advantage</td>
<td>(6-14)</td>
</tr>
<tr>
<td>4</td>
<td>Customer involvement</td>
<td>(12-10)</td>
</tr>
<tr>
<td>5</td>
<td>Financial information</td>
<td>(5-4)</td>
</tr>
<tr>
<td>6</td>
<td>Improvement</td>
<td>(8-3)</td>
</tr>
<tr>
<td>7</td>
<td>People management</td>
<td>(7-4)</td>
</tr>
<tr>
<td>8</td>
<td>Knowledge</td>
<td>(6-3)</td>
</tr>
<tr>
<td>9</td>
<td>Accuracy</td>
<td>(4-3)</td>
</tr>
<tr>
<td>10</td>
<td>Intranet</td>
<td>(3-3)</td>
</tr>
</tbody>
</table>

Codes with both a high level of groundedness and a high level of density can be identified as meaningful (see Exhibit 101) and used to create a model for this case study.

**Exhibit 101. Case study 2 codes sorted by groundedness and density**

<table>
<thead>
<tr>
<th>Codes</th>
<th>Sorted by groundedness and density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management attention</td>
<td>(19-44)</td>
</tr>
<tr>
<td>Information assets</td>
<td>(26-39)</td>
</tr>
<tr>
<td>Competitive advantage</td>
<td>(6-14)</td>
</tr>
<tr>
<td>Customer involvement</td>
<td>(12-10)</td>
</tr>
<tr>
<td>Financial information</td>
<td>(5-4)</td>
</tr>
<tr>
<td>Improvement</td>
<td>(8-3)</td>
</tr>
</tbody>
</table>
Exhibit 102. Case study 2 model

In Exhibit 102, Management attention is focused on achieving Competitive advantage through Customer involvement. Investing in information assets such as Financial information leads to Improvement which brings Financial information to Management attention.

A grounded theory for Case study 2 is proposed:

Management attention is focused on gaining Competitive advantage through Customer involvement. Information assets such as Financial information are invested in to improve organisational effectiveness and benefit customers.

Recommendation
Case study 2 could implement strategies to capture knowledge which are not IT dependent. Such strategies might involve reward and recognition schemes and positively recruiting team players to the organisation.
6a.4 Case study 3

Case study 3 was based in East Anglia. The organisation was a large public sector organisation operating essentially as an industry quango, being funded by a mixture of membership contributions and government funding. Managers described the organisation’s activities and services as people centric rather than ICT centric. There were also major ICT initiatives underway with the organisation being midway through a five year ICT strategy when the case study was undertaken.

In the information asset scoring grid exercise Management information and Business processes were the most highly scored information assets for Case study 3. The quality and utility of such information assets was an important concern. This reflects the organisation’s internal focus which was also apparent in the interviews carried out with senior managers.

In interviews with 10 senior managers the organisation was reported to be in a strong position to exploit its information assets. There was a good deal of commercially applicable information in existence and several initiatives were underway to improve Management information. The organisation was also faced with a fast paced and evolving e-business and e-government agenda. Performance measurement using the EFQM (European Foundation for Quality Management) Excellence Model was being introduced. This, together with the need to update data protection and employee privacy policies presented the organisation with a raft of legal and policy issues related to its operating environment. The managers’ perception was that the energy expended in meeting the requirements of new legislation and in implementing the ICT strategy took managers’ attention away from the delivery of the high quality services that were required by the customers. Improving cost effectiveness of services through the ICT strategy was recognised, but in general, the long-term gains of implementing the ICT strategy were not perhaps being communicated widely enough.

Capturing people’s knowledge was identified as a significant area for the organisation and one that had yet to be addressed. People management was a
major concern and the managers interviewed were very aware that people played a central role in their organisation's success. Due to the complex nature of the organisation and the range of contracts it dealt with, the learning curve of new managers, in particular training officers, was unusually steep. Some managers described it in terms of years rather than months. Until new managers had a sufficient understanding of the organisation, their role was seen as limited. Several managers said that underperforming areas of the organisation were not addressed and were left to "muddle through" rather than benefiting from the wider expertise the organisation held which might be captured in best practice form. The intranet was seen as currently ineffective as a means of collecting and distributing best practice as it was not relevant to managers in the field who were dealing with "people" and not logging onto computers on a regular basis.

The organisation and its managers were also aware of the information technology issues involved in identifying and managing their information assets. However, managers complained that too much attention was being focused on implementing the ICT strategy to the detriment of People Management. While the ICT strategy may enable the organisation to meet information technology requirements, people remained central to the success of the organisation, according to the managers interviewed.
ATLAS/Ti Analysis

The interviews conducted with the 10 senior managers in Case study 3 were analysed using the specialist software ATLAS/Ti. Using ATLAS/Ti, unique codes are created for each interview which are either associated with text or can be created freely. Codes that are not associated with any text are shown with an associated number 0-0. Codes associated with one text are shown by 1-0 and so on. As the number of associations with text builds up, the code starts to take on a level of groundedness in the data. The second part of the associated number 1-0 refers to its degree. This is the number of relationships between the code and other codes so that one relationship would be shown as 1-1. This is the level of density of the code in the data, the number of important relationships and linkages with other codes. A high level of groundedness (indicated by the number to the left (29-46) which shows the number of times a concept has been coded) indicates the importance of issues frequently raised. The first 20 codes with a high level of groundedness for Case study 3 are shown in Exhibit 103:

Exhibit 103. Case study 3 codes sorted by groundedness

<table>
<thead>
<tr>
<th>No.</th>
<th>Codes</th>
<th>Sorted by groundedness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Information assets</td>
<td>(25-43)</td>
</tr>
<tr>
<td>2</td>
<td>People management</td>
<td>(20-14)</td>
</tr>
<tr>
<td>3</td>
<td>Management attention</td>
<td>(17-47)</td>
</tr>
<tr>
<td>4</td>
<td>Sharing information</td>
<td>(12-1)</td>
</tr>
<tr>
<td>5</td>
<td>Customer involvement</td>
<td>(10-8)</td>
</tr>
<tr>
<td>6</td>
<td>Information strategy</td>
<td>(9-1)</td>
</tr>
<tr>
<td>7</td>
<td>Improvement</td>
<td>(8-3)</td>
</tr>
<tr>
<td>8</td>
<td>Cost</td>
<td>(7-3)</td>
</tr>
<tr>
<td>9</td>
<td>Financial information</td>
<td>(6-3)</td>
</tr>
<tr>
<td>10</td>
<td>Competitive advantage</td>
<td>(5-15)</td>
</tr>
<tr>
<td>11</td>
<td>Intranet</td>
<td>(5-6)</td>
</tr>
<tr>
<td>12</td>
<td>Knowledge</td>
<td>(5-5)</td>
</tr>
<tr>
<td>13</td>
<td>Access</td>
<td>(5-3)</td>
</tr>
<tr>
<td>14</td>
<td>Individuals</td>
<td>(5-2)</td>
</tr>
<tr>
<td>15</td>
<td>Recognition</td>
<td>(5-1)</td>
</tr>
<tr>
<td>16</td>
<td>Quality</td>
<td>(4-2)</td>
</tr>
<tr>
<td>17</td>
<td>Communication</td>
<td>(4-1)</td>
</tr>
<tr>
<td>18</td>
<td>Benchmarking</td>
<td>(3-3)</td>
</tr>
<tr>
<td>19</td>
<td>Development</td>
<td>(3-2)</td>
</tr>
<tr>
<td>20</td>
<td>Investment</td>
<td>(2-3)</td>
</tr>
</tbody>
</table>
The number of relationships between codes, i.e. the linkages between them, is known as their density (indicated by the number to the right (29-46) which shows the number of times a concept has been linked with other concepts). The first 10 codes with a high level of density are shown in Exhibit 104:

Exhibit 104. Case study 3 codes sorted by density

<table>
<thead>
<tr>
<th>No.</th>
<th>Codes</th>
<th>Sorted by density</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Management attention</td>
<td>(17-47)</td>
</tr>
<tr>
<td>2</td>
<td>Information assets</td>
<td>(25-43)</td>
</tr>
<tr>
<td>3</td>
<td>Competitive advantage</td>
<td>(5-15)</td>
</tr>
<tr>
<td>4</td>
<td>People management</td>
<td>(20-14)</td>
</tr>
<tr>
<td>5</td>
<td>Customer involvement</td>
<td>(10-8)</td>
</tr>
<tr>
<td>6</td>
<td>Intranet</td>
<td>(5-6)</td>
</tr>
<tr>
<td>7</td>
<td>Knowledge</td>
<td>(5-5)</td>
</tr>
<tr>
<td>8</td>
<td>Financial information</td>
<td>(6-3)</td>
</tr>
<tr>
<td>9</td>
<td>Benchmarking</td>
<td>(3-3)</td>
</tr>
<tr>
<td>10</td>
<td>Investment</td>
<td>(2-3)</td>
</tr>
</tbody>
</table>

Codes with both a high level of groundedness and a high level of density can be identified as meaningful (see Exhibit 105) and used to create a model for this case study.

Exhibit 105. Case study 3 codes sorted by groundedness and density

<table>
<thead>
<tr>
<th>Codes</th>
<th>Sorted by groundedness and density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management attention</td>
<td>(17-47)</td>
</tr>
<tr>
<td>Information assets</td>
<td>(25-43)</td>
</tr>
<tr>
<td>Competitive advantage</td>
<td>(5-15)</td>
</tr>
<tr>
<td>People management</td>
<td>(20-14)</td>
</tr>
<tr>
<td>Customer involvement</td>
<td>(10-8)</td>
</tr>
<tr>
<td>Intranet</td>
<td>(5-6)</td>
</tr>
</tbody>
</table>
As shown in Exhibit 106, Management attention is focused on achieving Competitive advantage through Customer involvement and People Management. People management is highly influential in Case study 3 feeding into Competitive advantage, Customer involvement and Management attention. Investing in information assets such as the Intranet is also of concern to Management and warrants their attention.

A grounded theory for Case study 3 is proposed:

Management attention is focused on gaining Competitive advantage but relies heavily on good People Management which is also linked with Customer involvement and Management attention. Information assets such as the Intranet are invested in to improve organisational effectiveness but are of little benefit in harnessing knowledge expertise.
Recommendation

Case study 3’s focus on People management is supported by an extensive ICT strategy that is midway through a five year implementation phase and these should be seen as complementary rather than opposing strategies. Methods for formalising explicit knowledge in the organisation might be introduced successfully to supplement good People Management and provide the basis for the collection and sharing of best practice that has not evolved using the intranet alone.
6a.5 Case study 4

Case study 4 was based in the south of England. The organisation was a large private sector engineering consultancy that had undergone a number of restructuring programmes and management changes over the years. The organisation was competing with smaller and more flexible businesses in its field and had embraced knowledge management as a technique to improve business competitiveness. Strategy was high on the management agenda, with a great deal of senior management effort expended on developing a common “vocabulary” so that common goals could be met from a shared starting point. Despite this, many of the managers interviewed were unwilling to make statements about the organisation as a whole, preferring instead to report only on their own particular department or function.

In the information asset scoring grid exercise Customer information, Organisational information “Culture” and Product information were the most highly scored information assets for Case study 4. The quality, utility and productivity of such information assets were an important concern. This reflects the organisation’s concern with customers and products and with harnessing the expertise of the organisation within a competitive consultancy culture. These concerns were also apparent in the interviews carried out with the 12 senior managers.

Managers interviewed said that the organisation had a wealth of internal knowledge and experience that was not currently being captured effectively. In particular, product information such as project specifications, engineering drawings and specialist knowledge for operating in particular regional areas was being lost. The management of such information and experience was not being addressed in a cohesive way according to managers. There appeared to be a great deal of duplication of both effort and resources in relation to information and knowledge management within the organisation. Management restructuring and the introduction of new systems, including financial and human resources systems, had resulted in more centralised control but the impact of these initiatives was not being seen at an operational
level. In the meantime, valuable knowledge was being lost or even purposefully discarded due to a lack of sufficient resources and/or the identification of those responsible for its stewardship. A problem area was identified as services to customers which were described as dependent on individual managers and team initiatives rather than growing from good internal processes and systems.

Although managers were aware of a great deal of specialist knowledge within the organisation, they were not using this resource. Problems with accessibility to information assets were countered by a “fire fighting” approach with crises developing and problems dealt with quickly, rather than being assessed, planned and controlled. Reuse of specialist information was also made difficult because responsibility for maintenance of these assets were seen as the business of the client rather than the organisation. However, such information was also of value to the organisation, not only in stopping duplication of effort but also in maintaining its relationship with the client.
ATLAS/Ti Analysis

The interviews conducted with the 12 senior managers in Case study 4 were analysed using the specialist software ATLAS/Ti. Using ATLAS/Ti, unique codes are created for each interview which are either associated with text or can be created freely. Codes that are not associated with any text are shown with an associated number 0-0. Codes associated with one text are shown by 1-0 and so on. As the number of associations with text builds up, the code starts to take on a level of groundedness in the data. The second part of the associated number 1-0 refers to its degree. This is the number of relationships between the code and other codes so that one relationship would be shown as 1-1. This is the level of density of the code in the data, the number of important relationships and linkages with other codes. A high level of groundedness (indicated by number to the left (29-46) which shows the number of times a concept has been coded) indicates the importance of issues frequently raised. The first 20 codes with a high level of groundedness for Case study 4 are shown in Exhibit 107:

Exhibit 107. Case study 4 codes sorted by groundedness

<table>
<thead>
<tr>
<th>No.</th>
<th>Codes</th>
<th>Sorted by groundedness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Information assets</td>
<td>{30-43}</td>
</tr>
<tr>
<td>2</td>
<td>Management attention</td>
<td>{19-45}</td>
</tr>
<tr>
<td>3</td>
<td>Sharing information</td>
<td>{14-1}</td>
</tr>
<tr>
<td>4</td>
<td>People management</td>
<td>{13-5}</td>
</tr>
<tr>
<td>5</td>
<td>Customer involvement</td>
<td>{12-8}</td>
</tr>
<tr>
<td>6</td>
<td>Improvement</td>
<td>{11-3}</td>
</tr>
<tr>
<td>7</td>
<td>Information strategy</td>
<td>{10-1}</td>
</tr>
<tr>
<td>8</td>
<td>Competitive advantage</td>
<td>{8-15}</td>
</tr>
<tr>
<td>9</td>
<td>Risk analysis</td>
<td>{8-6}</td>
</tr>
<tr>
<td>10</td>
<td>Access</td>
<td>{7-3}</td>
</tr>
<tr>
<td>11</td>
<td>Cost</td>
<td>{7-3}</td>
</tr>
<tr>
<td>12</td>
<td>Quality</td>
<td>{6-2}</td>
</tr>
<tr>
<td>13</td>
<td>Individuals</td>
<td>{6-2}</td>
</tr>
<tr>
<td>14</td>
<td>Recognition</td>
<td>{6-1}</td>
</tr>
<tr>
<td>15</td>
<td>Knowledge</td>
<td>{5-4}</td>
</tr>
<tr>
<td>16</td>
<td>Communication</td>
<td>{5-1}</td>
</tr>
<tr>
<td>17</td>
<td>Intranet</td>
<td>{5-5}</td>
</tr>
<tr>
<td>18</td>
<td>Development</td>
<td>{5-2}</td>
</tr>
<tr>
<td>19</td>
<td>Accuracy</td>
<td>{4-6}</td>
</tr>
<tr>
<td>20</td>
<td>Financial information</td>
<td>{4-4}</td>
</tr>
</tbody>
</table>
The number of relationships between codes, i.e. the linkages between them, is known as their density (indicated by the number to the right (29-46) which shows the number of times a concept has been linked with other concepts). The first 10 codes with a high level of density are shown in Exhibit 108:

Exhibit 108. Case study 4 codes sorted by density

<table>
<thead>
<tr>
<th>No.</th>
<th>Codes</th>
<th>Sorted by density</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Management attention</td>
<td>(19-45)</td>
</tr>
<tr>
<td>2</td>
<td>Information assets</td>
<td>(30-43)</td>
</tr>
<tr>
<td>3</td>
<td>Competitive advantage</td>
<td>(8-15)</td>
</tr>
<tr>
<td>4</td>
<td>Customer involvement</td>
<td>(12-8)</td>
</tr>
<tr>
<td>5</td>
<td>Risk analysis</td>
<td>(8-6)</td>
</tr>
<tr>
<td>6</td>
<td>Accuracy</td>
<td>(4-6)</td>
</tr>
<tr>
<td>7</td>
<td>People management</td>
<td>(13-5)</td>
</tr>
<tr>
<td>8</td>
<td>Intranet</td>
<td>(5-5)</td>
</tr>
<tr>
<td>9</td>
<td>Knowledge</td>
<td>(5-4)</td>
</tr>
<tr>
<td>10</td>
<td>Financial information</td>
<td>(4-4)</td>
</tr>
</tbody>
</table>

Codes with both a high level of groundedness and a high level of density can be identified as meaningful (see Exhibit 109) and used to create a model for this case study.

Exhibit 109. Case study 4 codes sorted by groundedness and density

<table>
<thead>
<tr>
<th>Codes</th>
<th>Sorted by groundedness and density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management attention</td>
<td>(19-45)</td>
</tr>
<tr>
<td>Information assets</td>
<td>(30-43)</td>
</tr>
<tr>
<td>Competitive advantage</td>
<td>(8-15)</td>
</tr>
<tr>
<td>Customer involvement</td>
<td>(12-8)</td>
</tr>
<tr>
<td>Risk analysis</td>
<td>(8-6)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>(4-6)</td>
</tr>
</tbody>
</table>
In Exhibit 110, Management attention is directed toward Competitive advantage with the achievement of Competitive advantage enabled through Customer involvement. Information assets are receiving Management attention, however, there is concern with the accuracy of information. Management is concerned with clear and present risks to the business but have no strategies to deal with these.

A grounded theory for Case study 4 is proposed:

Management attention is focused on gaining Competitive advantage through Customer involvement. There is concern with the accuracy of Information assets. However, risk management strategies are lacking, which adversely affects long-term effectiveness.
Recommendation

Case study 4 may need to refocus its strategy on delivery of high quality services to customers in the short term and to develop longer term goals to improve asset management in the organisation. The loss of valuable information assets and the lack of operational pull-through for policies such as knowledge management may have serious consequences for the organisation. Management information may be improved by the introduction of new systems but needs to be linked to organisational goals and objectives if it is to be effective and to counteract the perceived risks to the business.
6a.6 Similarities and Differences

Case studies 1, 2, 3 and 4 showed a number of similarities in their ATLAS/Ti scores but also differed in a number of areas. As shown in Exhibit 11, Management attention, Information assets, Competitive advantage and Customer involvement were concerns shared by all the case study organisations. Concerns with their Intranet were also highlighted in Case studies 1 and 3.

As shown in Exhibit 11, differences also appeared at the lower levels of the ATLAS/Ti scores for each case study organisation. For example, Case study 1 showed a concern with Knowledge which was identified but not emphasised by the remaining three case studies. Case study 2 showed a concern with Financial information and with Improvement reflecting the ethos of the organisation as a small but successful and growing business. Case study 4 demonstrated a concern with Risk analysis and Accuracy showing awareness of the risk laden competitive environment the organisation was facing.
Exhibit 111. Similarities and Differences

<table>
<thead>
<tr>
<th></th>
<th>Management attention</th>
<th>Information assets</th>
<th>Competitive advantage</th>
<th>Customer involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case study 1</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Case study 2</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Case study 3</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Case study 4</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Knowledge</th>
<th>Financial information</th>
<th>Improvement</th>
<th>People management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case study 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case study 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case study 3</td>
<td></td>
<td></td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Case study 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Intranet</th>
<th>Risk analysis</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case study 1</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case study 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case study 3</td>
<td></td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Case study 4</td>
<td></td>
<td></td>
<td>√</td>
</tr>
</tbody>
</table>

As shown in Exhibit 111, Case study 3 showed a concern with People Management not demonstrated by the other three case study organisations. This may reflect the organisation’s status as a public body in a well-established field providing a secure and long-term home for employees. Differences in Case study 3 were also noted in the lower levels of their ATLAS/Ti scores with ratings for Benchmarking and Investment not appearing in the remaining case studies. While all of the organisations can be described as similar in that they shared a number of key concepts, Management attention, Information assets, Competitive advantage and Customer involvement, Case study 3 can be identified as different in its emphasis on People Management and the identification of strategies such as Benchmarking and Investment to realise this emphasis.
Further factors which may have influenced similarities and differences may be related to inherent differences in the four organisations selected for the case studies. Most notable was the difference between Case studies 1, 2 and 4 being corporate organisations and Case study 3 being a public sector organisation. Case study 3 did appear to be more people focused with an emphasis on training and development. Case studies 1, 2 and 4, while emphasising their awareness of KM, lacked the people management focus to pull through key policies to capture and leverage knowledge in their organisations.

Case study 3 also appeared to be more internally focused while Case studies 1, 2 and 4 were externally focused on customers and their organisations' ability to compete effectively and meet customers' needs. This may reflect a more long term workforce in the public sector organisation, one not entirely dependent on customers to secure their future. Paradoxically, the public sector organisation appears to be more effective in meeting customer needs through a focus on good people management and effective knowledge capture strategies.

6a.7 Summary
This chapter explored the case study evidence for each case study organisation. Individual ATLAS/Ti codes for each Case study organisation (groundedness and density) were generated. Models for each case study were described and a grounded theory proposed. Case studies 1, 2, 3 and 4 had a number of similarities. Case study 3, the public sector organisation, did differ somewhat in a notable emphasis on People Management (20-14).
Case study 1
Case study 1 identified: Management attention, Information assets, Competitive advantage, Customer involvement, Intranet and Knowledge as important.

A grounded theory for Case study 1 was proposed:

Management attention is focused on gaining Competitive advantage through Customer involvement. Knowledge management strategies are lacking which adversely affects long term effectiveness.

Case study 2
Case study 2 identified Management attention, Information assets, Competitive advantage, Customer involvement, Financial information and Improvement as important.

A grounded theory for Case study 2 was proposed:

Management attention is focused on gaining Competitive advantage through Customer involvement. Information assets such as Financial information are invested in to improve organisational effectiveness and benefit customers.
Case study 3

Case study 3 identified Management attention, Information assets, Competitive advantage, People management, Customer involvement and Intranet as important.

A grounded theory for Case study 3 was proposed:

Management attention is focused on gaining Competitive advantage but relies heavily on good People Management which is also linked with Customer involvement and Management attention. Information assets such as the Intranet are invested in to improve organisational effectiveness but are of little benefit in harnessing knowledge expertise.

Case study 4

Case study 4 identified Management attention, Information assets, Competitive advantage, Customer involvement, Risk analysis and Accuracy as important.

A grounded theory for Case study 4 was proposed:

Management attention is focused on gaining Competitive advantage through Customer involvement. There is concern with the accuracy of Information assets. However, risk management strategies are lacking, which adversely affects long term effectiveness.

6a.8 Conclusion

The four case studies revealed similarities and differences in their ATLAS/Ti scores. There does appear to be a difference in emphasis between the three corporate organisations, Case studies 1, 2 and 4 and the public sector organisation, Case study 3, most notable in an emphasis on People Management.
CHAPTER 7

7. A GROUNDED THEORY OF INFORMATION ASSETS

In this chapter, a grounded theory of information assets is proposed for Case studies 1, 2, 3 and 4 and an alternate model is also suggested for Case study 3. An introduction, Section 7.1, is followed by the description of a grounded theory of information assets for Case studies 1, 2, 3 and 4, Section 7.2. An alternate theory is also proposed for Case study 3. The use of models to visually represent the grounded theory of information assets for Case studies 1, 2, 3 and 4 is described in Section 7.3. The general model of the grounded theory of information assets is described in Section 7.4. The significance of the model is discussed in Section 7.5 and implications for the research study are described. An alternate model for Case study 3 is described in Section 7.6. The chapter concludes with a summary and conclusion, Section 7.7 and Section 7.8.

7.1 Introduction

The development of a grounded theory of information assets from the categories identified in the analysis of the case study data for Case studies 1, 2, 3 and 4 using ATLAS/Ti and described in Chapter 6a is presented. Management attention, Information assets, Competitive advantage and Customer involvement appeared to link across many of the categories identified. A causal loop model (Exhibit 112) is used to illustrate the links and relationships between the core category (Competitive advantage) and the other categories identified as being important. The general model represents the hidden impacts which occur in the case study organisations (Case studies 1, 2, 3 and 4) as a result of their focus on external effectiveness, namely, meeting the needs of Customers. An alternate individual model for Case study 3 is also presented to highlight the organisations focus on People Management. An additional grounded theory of information assets is also developed for Case study 3.
7.2 A grounded theory of information assets

Management attention, Information assets, Competitive advantage and Customer involvement were concerns shared by all the four case study organisations. Case study 3 also showed a clear concern with People Management (20-14). While there is insufficient difference between the ATLAS/Ti scores generated for the four case studies to justify a separate and distinct model for Case study 3, it is interesting to create an alternate model for Case study 3 to highlight this difference in concern. Therefore, both a general and alternate grounded theory of information assets are proposed:

A general grounded theory of information assets is proposed for case studies 1, 2, 3 and 4:

**Competitive advantage is the focus of management’s attention.**

Management’s attention is directed towards customers resulting in external effectiveness. Information assets not connected with customers receive limited management attention. This results in competitive disadvantage, which appears only after a delay.

The grounded theory of information assets proposed for these case studies shows that a very limited approach to the management of information assets exists in these case study organisations. The importance of competitive advantage to today’s organisations is apparent but the use of information assets to create competitive advantage is limited to very tangible aspects such as Customer databases. Information assets that have an impact on the organisations’ external relationships with customers attract investment while internally-focused information assets, such as employee knowledge, are not effectively addressed.
Case study 3

An alternate grounded theory for Case study 3 is also proposed:

Management attention is focused on gaining Competitive advantage but relies heavily on good People Management which is also linked with Customer involvement and Management attention. Information assets such as the Intranet are invested in to improve organisational effectiveness but are of little benefit in harnessing knowledge expertise.

The grounded theory of information assets proposed for Case study 3 shows that a more open approach to the management of information assets exists in this case study organisation. The importance of competitive advantage to Case study 3 is apparent but the use of information assets to create competitive advantage is less limited. Information assets that have an impact on the external organisation are invested in but there is also investment in internally-focused information assets, such as the Intranet and People Management. Essentially, however, the focus remains on the information assets identified as significant by the three other case study organisations, that is, Management attention, Information assets, Competitive advantage and Customer involvement. While Case study 3’s concern with People management is promising it does not overarch concerns with more traditional externally focused information assets. Case study 3 should therefore be included within the general model of information assets, since an alternate model, although interesting, is not justified by any striking differences between the four case study organisations.
7.3 Use of models

The use of models helps focus thinking on the complex ways the role of information assets was perceived by the senior managers in the four case study organisations. Representing links and relationships between concepts such as information assets and effectiveness and information assets and management attention were critical in gaining insights into the role of information assets. To describe the links and relationships developed from the case study data a causal loop model was employed.

7.3.1 Causal loop models

Causal loop models are used to represent relationships in a system. A causal loop diagram is a simplified functional diagram in which the functional elements are removed and replaced with S (for same) and O (for opposites). These types of models can be used to describe systems at a higher level without necessitating definitions of each and every relationship to be made (Byrknes & Myrtveit 1996, p.11).

The model used for Case studies 1, 2, 3 and 4 is a “Shifting the burden” system archetype (Senge et al. 1994, p.136). This model is one of four system archetypes identified by Senge et al. (1994, p.121). These are:

- fixes that backfire, i.e., where a problem symptom alternately improves and deteriorates despite efforts at improvement;
- limits to growth, where there is growth levelling off or falling into decline;
- shifting the burden, where reliance on “quick fix” strategies grows stronger while efforts to correct the real problem grow weaker so that the problem alternately improves and deteriorates, and;
- tragedy of the commons, where total activity grows but gains from individual activities are dropping (Senge et al. 1994, pp.122-123).
There are three simultaneous behaviours in a “Shifting the burden” situation. The first of these, the quick fix, continues upwards - especially with the onset of addiction. Addiction occurs when certain behaviours, for example, heroics are rewarded. Reward reinforces the behaviour without questioning whether this results in long-term benefit for the organisation. For example, an organisation may be constantly in reactive mode, with managers fire-fighting problem situations. These managers are rewarded for putting out the fires and so they become addicted to fire-fighting behaviours rather than addressing the underlying problems that create crisis situations. Secondly, the problem symptom moves up and down but gradually rises over time, sometimes seeming to disappear completely only to reappear. The third variable, the corrective action or solution, declines (Senge et al. 1994, p.137).

The model shown in Exhibit 112 has two balancing loops which represent two different types of “fix” for the issue of competitive advantage. The upper loop in Exhibit 112 is a “quick fix” with the bottom loop representing measures that take time to implement and are more difficult to introduce. There are also two additional reinforcing loops which are called “addiction” loops. These degrade the system and represent unintended consequences that compound the original problem. Addiction loops become worse than the original problem because they make it much more difficult to address the fundamental difficulty.

7.3.2 Software used to create the model
The software, Powersim, was used to create the model. Powersim takes its name from Powerful Simulation and is a software package designed to make complex business simulations based on the modelling methodology of system dynamics (Bryknes & Cover 1996, p.1). A dynamic model is a collection of variables that influence each other over time (Byrknes 1996, p.2).

Powersim allows users to build a model that represents the elements of a system and how they interact with one another. By taking the modelling process a step further to act as a simulator, the package provides a safe environment for experimentation in both policy formulation and decision-
making. Powersim is flexible, and though it has many levels of complexity it is easy to learn and intuitive.

7.4 Model of the grounded theory of information assets for Case studies 1, 2, 3 and 4

In Exhibit 112, The “S” and “O” arrows represent the direction of influence “Same” and “Opposite” between two variables (Byrknes 1996, p.118). (These are indicated by + and – signs in Exhibit 112). A route that returns to the same variable from which it starts out represents “circular causality”. The stability of such a circle depends on the number of “O” signs it contains. When this number is even, the cycle is reinforcing. Once a variable has begun to move in one direction, it will continue in that direction. When there is an odd number of “O” signs, the cycles are balancing and stable. “D” represents a delay between the action and the outcome.
Exhibit 112. Grounded theory of information assets

SYMPTOM-CORRECTING PROCESS

Prioritisation of Investment in Customers (Customer Involvement) +

External Effectiveness +

PROBLEM SYMPTOM

Lack of Competitive Advantage -

Internal Effectiveness -

PROBLEM-CORRECTING PROCESS

Investment in Non Customer Related Information Assets +

Non Customer Related Information Assets not seen as Priority -

Management Attention shifts to Customers +

Quick Fix

PROBLEM-CORRECTING PROCESS

Key

B = Balancing Loop
R = Reinforcing Loop
D = Delay
+ = Causes change in same direction
- = Causes change in opposite direction

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In Exhibit 112, the four similarities identified between Case studies 1, 2, 3 and 4, that is, Management attention, Information assets, Competitive advantage and Customer involvement are shown within the context of internal and external effectiveness. The problem symptom is identified as lack of **Competitive advantage**. As the four case study organisations invest and grow, they require more formal communication networks and policies to maintain competitive edge. Increasingly active communication networks should result in information sharing but senior managers are inundated with communications. To address this, managers focus on what is seen as most important to the business: Customers.

**Management attention** shifts to **Customers** which results in the Quick fix of investment to enhance customer services. Senior managers prioritise investment in customer databases. Senior managers look for constant improvements in these systems and empower employees to meet the needs of customers. This results in **External effectiveness** for the organisation's members where it is succeeding in meeting customer needs, retaining and building customer relationships and using people skills to enhance those relationships. However, an organisation is made up of more than just its customers and managers, and they interact on many different levels. Non Customer related **Information assets** are not seen as a priority for investment. Service documents, project information assets and employee knowledge reuse are not given sufficient management attention.

As investment is focused on **Customer involvement** and **External effectiveness**, the **Internal effectiveness** of the organisation decreases. These two, internal and external effectiveness, need to work together for the organisation to retain its members and survive (see Exhibit 16). **Management attention** is moreover focused on ensuring basic quality of information assets rather than innovative or value-creating strategies. This leads to internal ineffectiveness which in turn eventually leads to a decrease in **Competitive advantage**.
Quick Fix

Lack of Competitive advantage is given the “quick fix” of Customer involvement in a balancing loop. This results in the addictive loop of Management attention shifting to customers and prioritisation of investment in Customers. Senior managers see External effectiveness as the goal to be achieved. To build Competitive advantage, the much more difficult task is to build information assets which enhance both External and Internal effectiveness, via another balancing loop. Balancing the internal and external groups would build Competitive advantage. However, lack of Internal effectiveness only emerges after a delay so that the cycle continues with the problem symptom, Competitive advantage, intermittently appearing and disappearing.

Addressing the quick fix addiction for Case studies 1, 2, 3 and 4

The solution to this seems at first glance to be a shift in Management attention from Customers to more varied Information assets. However, the case study organisations’ senior managers saw Customer involvement as the major determinant of their organisations’ success. Information assets had an underpinning role in that success but were not creators of success in themselves. The solution may not be to divert Management attention from Customer involvement but to direct the attention that is available towards more value-creating information activities. This focuses on the value-creating and innovative aspects of Information assets rather than traditional customer databases and IT systems. It also positions Information assets as being essential for Internal effectiveness which impacts on Competitive advantage, an issue of concern to all of the case study organisations and, by extension, to all organisations facing competitive challenges.

7.5 Significance of the model for Case studies 1, 2, 3 and 4

Competitive advantage is a well-established concept in organisations and many organisations have competitive strategies and risk management policies in place. However, the model developed of the grounded theory of information assets for Case studies 1, 2, 3 and 4 shows that the senior managers interviewed had a very one-dimensional view of competitive
advantage equating it with the needs of customers and external effectiveness. This may mean that competitive strategies need to be rethought and eventually refocused to provide the managerial and organisational flexibility to respond to unforeseen challenges.

The second implication of the grounded theory of information assets is that organisations are not giving sufficient management attention to those information assets that create long-term value and enhance internal effectiveness. If this is indeed the case then it has worrying implications for their long-term survival and growth. At the very least, it implies that these organisations will continue to move from crisis to crisis without addressing fundamental management and organisational issues.

Finally, the grounded theory of information assets implies that, whilst senior managers are aware of the long-term benefits of managing a whole range of information assets for organisational effectiveness, they are constrained in their ability to do so. This may eventually lead to frustration with the whole area of information asset management. Senior managers who are measured and managed according to strict performance criteria have little scope to implement more people-centred initiatives which promote knowledge-sharing. The exception to this is Case study 3 which demonstrated an awareness of People Management as a route to improved effectiveness. While this awareness was insufficiently strong to justify an additional model for Case study 3, it is interesting to highlight this difference by presenting an alternate model.
7.6 Model of the grounded theory of information assets for Case study 3

An alternative grounded theory for Case study 3 is also proposed which reflects a more central role for People Management in this organisation:

Management attention is focused on gaining Competitive advantage but relies heavily on good People Management which is also linked with Customer involvement and Management attention. Information assets such as the Intranet are invested in to improve organisational effectiveness but are of little benefit in harnessing knowledge expertise.

Exhibit 113. Case study 3 model

The more central role of People management shown in Exhibit 113 counteracts the external focus of the organisation on customers. This means that more management attention is directed toward internal information assets than is the case with Case studies 1, 2 and 4. This appears to be a result of a more people focused organisation but whether this is a planned or accidental outcome is unknown. The difference between Case study 3 and Case studies 1, 2 and 4 (see Chapter 6a) is, however, so insignificant that it is more useful to include Case study 3 within the general model for information assets.
7.7 **Summary**
A grounded theory of information assets, which takes Competitive advantage as its core category, was presented for Case studies 1, 2, 3 and 4. An alternate grounded theory for Case study 3, focusing on People Management, was also presented to highlight this Case studies concern with People. However, the differences between Case studies 1, 2, 3 and 4 were insufficient to justify a separate model for Case study 3. Case studies 1, 2, and 4 were primarily focused on external effectiveness and on building the information assets that enhanced external effectiveness, i.e. Customer information assets. Case study 3 counteracted this focus with an emphasis on People Management but this was not sufficient to change its overall emphasis so that it can be more usefully included within a general model and grounded theory of information assets. The role of information assets in enhancing organisational effectiveness as a whole is highlighted in all four case study organisations.

7.8 **Conclusion**
A general grounded theory of information assets provides some insights into the unintended consequences which a less than holistic approach to information assets and their attributes can have for organisations. The general theory was illustrated using a causal loop diagram and the significance of the theory discussed. The general theory is supported by the literature in the following ways:

- Competitive advantage has been identified as an important benefit of information management (Porter 1985). However, it has never been clear how information provides competitive advantage or why some organisations create more added value from their information than others. The general grounded theory of information assets suggest that there is an unintended consequence of investing in certain types of information assets to the neglect of others which results ultimately in competitive disadvantage.
Organisational effectiveness or the notion of a link between information and organisational performance has seen progress in recent years (Marchand 2000, Marchand et al. 2001a, 2001b). However, there still remains a sizeable gap in the literature so that organisational effectiveness remains an ill-defined area. The general grounded theory of information assets suggests that it is more useful to view organisational effectiveness as two competing areas of internal and external effectiveness. These were the distinctions made by the senior managers interviewed when they highlighted externally-important information assets rather than internally-important ones.
CHAPTER 8

8. DISCUSSION

In this chapter, the aims and objectives of the research study are discussed in relation to the research findings.

There is a brief introduction, Section 8.1.

Section 8.2 discusses the extent to which the research findings meet the study’s aims and objectives.

Section 8.3. discusses the research findings within the context of the literature reviewed.

In Section 8.4. the important findings of the research are highlighted.

Section 8.5 outlines the limitations of the research and of the research findings.

The chapter concludes with a summary and conclusion, Sections 8.6 and 8.7.
8.1 Introduction
The research study is discussed in relation to the aims and objectives of the research, major findings are highlighted in the context of the literature review. Important findings of the research study are examined. The limitations of the research and research findings are outlined.

8.2 Aims and objectives
The aim of the research study was to describe an indicative exploratory model concerning the role of information assets in enhancing organisational effectiveness. To this end, a grounded theory of information assets was developed which demonstrates the unintended consequences of a managerial focus on external information assets resulting in competitive disadvantage and ultimately a downgrade in organisational performance.

The case study data provided the basis of the grounded theory model. Case study data was also examined for each individual Case study. Additionally, the preliminary research provided important input in both designing the case studies themselves and in developing theory. Each of the research objectives, the research methods and analysis approaches employed, their subjects and major findings are summarised in Exhibit 3, Chapter 1. Each of the research objectives, 1-6, will be discussed.
1. What information assets are held and used by a selection of information-intensive UK organisations?

*Senior British information managers’ focus group*

Information assets identified by the Hawley Committee (KPMG/IMPACT 1994) were discussed and updated by the senior British information managers’ focus group. Four major changes to the Hawley Committee’s categorisation of information assets were made by the senior British information managers’ focus group.

1. Specialist Knowledge – This information asset was rejected by the senior British information manager’s focus group since it was not felt to be a clear-cut information asset, bringing issues concerning the definition of knowledge to the fore.

2. Accounting information – This information asset was not recognised as referring to legal information by the information managers’ focus group. Renaming the asset as Legal and Regulatory was recommended to provide its immediate recognition as an asset concerning, for example, health and safety information.

3. Human resource information – This information asset was perceived to be out of date and was renamed People management.

4. Organisational information – This information asset was not included in the Hawley Committee’s identification of information assets. It highlights the importance of organisational culture in the information management practice of senior managers and was recommended as an important and neglected information asset by the senior British information managers’ focus group.
**Five senior executives**

Open-ended guided interviews with five senior executives found that a narrow focus on identifying discrete information assets was an inadequate approach. Rather, a broader strategic role for information assets within the wider business performance framework was seen as being more relevant by the senior executives interviewed. Information assets gained value through meeting business objectives and changed as objectives changed.

Repertory grid exercises with the five senior executives identified Product and Customer information as having an overarching role in their organisations. Uses of information assets included: planning and control, managing internal and external operating environments, providing organisational direction and momentum, and decision-making.

**Six internationally-active information professionals**

Open-ended guided interviews with six internationally-active information professionals identified a role for information assets in enhancing organisational effectiveness. The use of information assets was identified as a key area for demonstrating value.

**Case studies**

The information asset-scoring grids developed for the case studies identified Customer information (Case studies 1, 2 and 4) and Management information (Case study 3) as important information assets. In the open-ended guided interviews with 45 senior managers the information asset identified most strongly in the four case study organisations was Customer information. Investment was primarily IT focused. Case study 3 showed an emphasis on People Management which provided a counterbalance to a focus on Customers and an alternated grounded theory and model for Case study 3 were developed. However, it is readily included within a general model for all four cases studies.
Summary
The research study succeeded in identifying what information assets were held and used in a selection of information-intensive UK organisations. Customer information assets predominated. However, a range of issues concerning the use and value of information assets was also identified and key amongst these was Competitive Advantage which formed the base for a grounded theory of information assets. The variety of research methods employed and the elite nature of the interviewees provided a rich picture of the information assets held and used in today's information-intensive organisations.

2. What are the significant attributes of these information assets?

Senior British information managers' focus group
The focus group with senior British information managers suggested that attributes identified from the literature were out of date and in need of updating. They also suggested a more visual scoring system for attributes of information assets which highlighted important information assets. This led to the development of an information asset-scoring grid for the case study work.

Five senior executives
Attributes of information assets were described in terms of inherent qualities of information assets and in terms of the information asset as a resource in itself. Attributes identified by the five senior executives were very varied and wide-ranging but there was a notable absence of economic attributes. The attributes described were primarily non-traditional focusing on activities such as planning and control, managing internal and external operating environments, providing organisational direction and momentum, and decision-making.

Six internationally-active information professionals
A wide range of attributes of information assets were identified by the six internationally-active information professionals. There was a lack of economic attributes of information assets which may suggest that it is
information professionals themselves who are reluctant to place a value on information assets.

Case studies
The information asset-scoring grids developed for the case studies identified Quality and Utility as important attributes. In the open-ended guided interviews with 45 senior managers the information attribute identified most strongly in the four case study organisations was Quality. The impact of attributes of information assets was a significant factor, for example, in business improvement.

Summary
While the focus group of senior British information managers and the repertory grid interviews with senior executives suggested that traditional attributes of information assets were not identified, the subsequent case study work saw traditional attributes such as Quality emerge as being most important. The six internationally-active information professionals also focused on inherent attributes of information assets. This suggests that, unless these basic attributes are in place within an organisation, economic or impact based attributes will not be recognised. The research aim was met.

3. What mechanisms are used by senior managers in these information-intensive UK organisations to identify, manage and protect information assets?

Five senior executives
A range of formal mechanisms were used to identify and manage information assets. Mind mapping and business process mapping were used to identify information assets - particularly in product development work or marketing. Information technology tools such as databases and management information systems also featured. Tools such as intranets, extranets, database management systems, resource-planning software and Lotus Notes packages were also prominent. Finance Director, Company A, named an Executive
Management team as a mechanism for identifying information assets. Its task was to set the agenda of the business, to identify business needs and then specify information required to meet those needs.

Case studies
Identification mechanisms for information assets were both formal and informal and included: intranets, customer reviews and management meetings. IT and security policies predominated the management and protection of information assets with intellectual property issues mentioned only rarely.

Summary
Formal mechanisms for the identification, management and protection of information assets predominated. In particular, IT and security policies were frequently given as examples of organisational efforts to manage and protect information assets. It may be that a less formal approach to the identification, management and protection of information assets would lead to a broader range of information assets being identified. The research aim was met.

4. What is the role of attributes of information assets in enhancing organisational effectiveness?

Five senior executives
Information assets have a role in improving the effectiveness of, and decision-making processes in their organisations, according to the five senior executives interviewed.

Case studies
The role of information assets in enhancing organisational effectiveness was described in terms of improving communication, identifying hoarders (non-sharers) of information assets and enhancing decision-making, essentially internally-focused roles. Competitive advantage emerged as a core concern.
Six internationally-active information professionals

The six internationally-active information professionals saw a role for information assets in enhancing organisational effectiveness. The major difficulty identified was in separating out the impact of information assets from other variables.

Summary

A role was identified for information assets in enhancing organisational effectiveness, for example, improved communication and decision-making. However, difficulties were identified in separating out the impact of information assets from other variables. The research aim was met.

4. Can the effects of attributes of information assets be measured?

Case studies

A total of 34 senior managers out of 45 reported their organisations did not measure the effects of attributes of information assets. Measurement, where it occurred, focused on cost and time-saving measures. These traditional measures were recognised as limited with a focus on the impact of information, in terms of business improvement, being seen as an important indication of value.

Six internationally-active information professionals

The six internationally-active information professionals said that little progress had been made in measurement of the effects of information assets. The major deterrent factor identified was the situational nature of information use. The use of information was the central factor in demonstrating its value.

Summary

Findings from the research study indicate that the effects of information assets can be measured but that the purpose of such measurement is still focused on traditional cost and time-saving rather than identifying any value-creating impacts of information assets. There was recognition that a focus on the impact of information, especially in terms of business improvement, would
demonstrate value. However, the use of information remained a central concern; if information was not used to create value then it did not inherently possess value. The research aim was met.

5. What are the implications for the theory and practice of information asset management?

Literature review

Information assets were seen as having a role in enhancing organisational effectiveness in the empirical work carried out for this research study. However, this role, until recently, has been largely unexplored in the literature. There is a need to develop further evidence-based arguments for a link between information assets and organisational performance.

Six internationally-active information professionals

The theory and practice of information asset management requires an empirical approach based in information use if progress is to be made. Indeed, progress is dependent on recognising information assets in use in organisations. This is made more difficult by the problem of identifying information inputs to business objectives and separating these out as value drivers. Therefore, little progress may be made until a more clear-cut role for information assets can be identified.

Summary

Implications for the theory and practice of information asset management were interesting, being focused on demonstrating a role for information assets in use in organisations and in building links between information assets and organisational performance. The implications are that, unless this approach is taken, the theory and practice of information asset management will have limited success. The research aim was met.
8.3 Research findings within the context of the literature reviewed

The literature reviewed for this research study was wide-ranging and provided an important context for the empirical work undertaken. Several issues identified in the empirical work were also identified during the literature review and these will be outlined next.

Human communication

Research on the limitations of human communication (Miller 1956) indicates that disparate stores of information may be more difficult for humans to process and hence recognise as being valuable. The identification of information as an asset may have provided an aid to the communication of the value of information as it aids human communication. The identification of information assets may be more pivotal in enabling recognition of their value than indicated in the literature.

Common-sense approach and Cognitive-approach

Two approaches to the management of information were identified from the literature, the common-sense approach and the cognitive-approach. In the case study work carried out for this research study the four organisations did demonstrate that each approach exists. Case studies 1 and 4 (the consultancy based organisations) demonstrated the common-sense approach while Case studies 2 and 3 demonstrated the cognitive-approach. The literature argues (Yates-Mercer & Bawden 2002) that organisations which take the common-sense approach will be less successful in managing their information than will those that take the cognitive-approach. This is supported by the research findings: information strategy was described as being poor by senior managers in Case studies 1 and 4 and as being good or exceptional by senior managers in Case studies 2 and 3. This distinction was also found in the organisational effectiveness models followed by the case study organisations. Case studies 1 and 4 followed the goal attainment model while Case studies 2 and 3 were more focused on their internal processes at the time of the research study. It may be that a certain approach to the management of information is also reflected by an organisation's approach to achieving organisational effectiveness.
Knowledge management and information management.
Orna (2004) argues that there is much common ground between information and knowledge management and that an artificial distinction has been made between the two fields. The research study argued for integration of data, information and knowledge and of data, information and knowledge assets. There appeared to be little difficulty with this approach and it was accepted by all of the research subjects interviewed. This may indicate that a merging of the areas may represent a more effective approach.

Value of information
The literature suggests that the value of information is not objective; indeed, information has no inherent value (Orna 2004, pp.131-132). Difficulties with quantifying the value of information, an issue identified in the Reuters (1995, p.5) report on information as an asset, were also found to be a concern of senior managers. An approach that recognises that information has a unique role as a lubricant, that it enters into all aspects of a business, and that its value increases as it is shared is also relevant. Value comes from people transforming information into knowledge and action. Therefore, only the effects of attributes of information assets help to judge value. The value added or value-creating role of information can be highlighted using an approach based on future economic benefits. This approach allows information assets to be viewed in much the same way as intangible assets in organisations. The traditional view of assets as static and information and knowledge as dynamic has been overturned by research in the intangible assets field which highlights the value-creating yet changing nature of intangibles assets.

Information assets
Fincham and Roslender (2003) found that managers are paying significant attention to knowledge-based intangible assets even if they do not recognise the term Intellectual Capital. Information assets were used in decision-making and strategic activities by the senior managers interviewed. A central role for information assets in organisations was identified in the case study research, but this was tempered by recognition that the ownership of
information assets remained with the employee rather than the organisation with relatively few senior managers willing to place a monetary value on information assets or state a replacement value for them. This is supported in the literature on organisational learning and communities of practice which highlights the role of the individual as the enabler of value creation. This led to a focus on external effectiveness with Customer information assets being the most frequently identified by Case studies 1, 2 and 3. Case study 3 showed an emphasis on People Management which provided an internal focus for its managers.

The role of information assets in enhancing competitive advantage emerged as the most common concern of the senior managers interviewed in the four case studies for this research. Competitive advantage demanded management's attention. Ensuring competitiveness focused on meeting customers' needs rather than building less traditional but perhaps, in the longer term, more valuable information assets. Case study 3 showed an alternate focus on People Management but the over-arching concern was Competitive advantage.

Customers represent only one variable involved in achieving competitive advantage and, as new challenges emerge, organisations which rely solely on existing customers may be threatened. However, the focus on customers was a necessary determinant of success for the senior managers interviewed and did result in external effectiveness. All the organisations studied were successful businesses, but many of the senior managers also saw their organisations as being internally ineffective with the re-use of information and “lost” information being of concern. The redirection of management attention toward less traditional information assets is not proposed but rather a focusing of the available management attention to less traditional information assets is recommended.

Attributes of information assets
Marchand et al. (2001b, p.91), in a European study involving over 1200 senior managers, found that the quality of information (updating and refreshing) was of greater concern than its reuse. This finding is supported by the research
findings. The quality of information was identified as its most important attribute by senior managers in all four case study organisations. However, the reuse of information, especially project-based information, was also of importance to the consultancy-based organisations, Case studies 1 and 4. It would be interesting to investigate whether there is a relationship between the type of business operation (e.g. manufacturing, consultancy) undertaken by the organisations studied by Marchand and the attributes identified as being significant by them. Quality of information was also identified as a source of competitive advantage by Broady-Preston and Williams (2004) in their study of City of London legal firms.

Attributes of information assets described by the five senior executives, six internationally-active information professionals and 45 senior managers in the case study organisations were also much wider than those identified in the literature. Those identified in the literature fell into three categories: inherent, impact and economic attributes. While all three categories were reflected in the research findings, it was clear that economic attributes were far more rarely recognised than attributes concerning quality, for example. It appears that economic attributes of information assets have seen little progress. However, impact attributes are an increasingly recognised area, and have expanded to encompass strategic and performance-related issues, such as planning and control and managing internal and external operating environments. Similarly, the measurement of the effects of information assets may not be as clear an indication of their value as their impact on overall organisational performance. However, measuring value does have a positive impact on the perceptions of senior managers of information assets.

Organisational performance
The lack of coverage of organisational effectiveness in the literature has seen recent improvement, most notably the link identified by Marchand et al. (2001b) between the positive information orientation (IO) of an organisation and its business performance. However, the role of information assets in enhancing organisational effectiveness is still unclear. This may not be a negative finding, since there is good recognition that it is the use of
information to create business value that improves effectiveness. As it is difficult to separate out the impact of information from other value-creating activities, recognition that information has an underpinning and enabling role in enhancing organisational performance is significant.

8.4 Important findings of the research study
The literature on information as an asset (KPMG/IMPACT 1994, Reuters 1995, Boisot 1998) argues that senior UK managers are not aware of the information assets held and used by their organisations and, as a result, are not managing them effectively. The research findings show that senior managers do recognise a range of information assets. However, a distinction appears to exist between the management of those information assets that can be seen to have a direct impact on external business performance (such as Customer information) and less tangible information assets (such as Communication) which impact on internal effectiveness. A grounded theory of information assets, which takes Competitive Advantage as its core category, attempts to illustrate this phenomenon. While a role for information assets is identified in creating competitive advantage, decision-making and strategy, these do not receive the management attention that more tangible information assets relating to customers and products enjoy. Case study 3 shows an alternate emphasis on People Management which counteracts the external focus of the organisation but there remains a strong emphasis on Competitive advantage, Customer involvement and Information assets.

Attributes of information assets identified in the literature were shown to be out of date. Inherent, impact and economic attributes are recognised by senior managers. However, economic attributes have seen little progress. The impact of information assets on organisational performance was shown to be a central concern of the senior managers interviewed for the case study research. Again, the focus was on externally-recognised attributes rather than internally-significant attributes.

The research findings appear to support a link between enhanced organisational performance and good management of information assets, most
notably in the senior managers’ concern with Competitive Advantage. However, the grounded theory of information assets suggests that this link is somewhat hidden by a concentration on enabling external effectiveness in supporting Customers which has the unintended consequence of degrading internal effectiveness which ultimately results in competitive disadvantage.

8.5 Limitations of the research and of the research findings
The range of research methods used to investigate the information as an asset domain did not bring conclusive results. A wide range of research methods was used. These were people-focused and sought to explore issues which are often hidden in organisations. The focus group with senior British information managers proved an effective method of honing initial research ideas and ensuring that these were relevant to practitioners. The focus group findings encouraged me to explore further the open identification of attributes of information as an asset. The repertory grid technique was chosen for this purpose. It was used primarily as a mechanism by which the five senior executives could be asked to describe attributes of information assets that they considered important, without prompting by the interviewer. The method enabled attributes of information assets to be described freely. The attributes identified were wide-ranging but proved unwieldy in practice and were not used in the case study research.

In interviews with six internationally-active information professionals, the aim was to investigate some of the wider issues surrounding the identification of information as an asset and organisational effectiveness. The situational nature of information use was the major concern of the senior information professionals interviewed. Attempting to place a value on information, which was dynamic and subject to the changing perceptions of the users, was seen as an impossible task.

In the case study interviews with senior managers some surprising similarities were found in very different UK organisations. Almost all of the senior managers interviewed saw a role for information assets in enhancing the effectiveness of their organisations. They also saw a role for information
assets in improving communication and decision-making. However, the practical application of information assets was focused on external operating environments.

A grounded theory of information assets has also been proposed. However, it is important to recognise that this is a tentative exploratory theory. Indeed, this is a key characteristic of the grounded theory approach, as stated by Glaser (1978, p.6):

"Grounded theory... makes (the analyst) humble to the fact that no matter how far he goes in generating theory, it appears as merely "openers" to what he sees that could lay beyond."

The use of relatively new approaches such as grounded theory is justified. Grounded theory enables new models, concepts and theories to be generated in a systematic way that aids theory building. It is recognised, however, that the grounded theory proposed is only one of several possible theories that might have emerged from this research study and an alternate theory was proposed for Case study 3. As such the research findings are tentative.
8.6 Summary
In this chapter, the research aims and objectives have been revisited and the research findings have been shown to meet them. The research study has also identified Customer information assets and the attribute of Quality as the key information asset and attribute recognised by senior managers. A role for information assets in enhancing organisational effectiveness suggested in the literature has been supported by the research findings and indicates that this is an under-examined research area. The limitations of the research and the research findings have been outlined.

8.7 Conclusion
In applying the research findings to the research aims and objectives, the role of information assets in enhancing organisational effectiveness has been central. However, none of the research findings point conclusively towards a role for information assets in enhancing organisational effectiveness. Rather, a tentative exploratory theory has been proposed, a grounded theory of information assets, which attempts to explore the importance of information assets in achieving organisational effectiveness and the disadvantages of a primarily externally-focused management.
CHAPTER 9

9. CONCLUSIONS

In this chapter, conclusions on the research study are reached.

There is a brief introduction, Section 9.1.

Section 9.2 presents conclusions regarding the aims and objectives of the research study.

Section 9.3 presents conclusions regarding the research findings within the context of the literature reviewed.

In Section 9.4 conclusions are presented regarding the important findings of the research.

Section 9.5 presents conclusions regarding the limitations of the research and of the research findings and makes suggestions for further research.

The chapter concludes with a summary and conclusion, Sections 9.6 and 9.7.
9.1 Introduction
This research study was exploratory and did not seek to produce definitive findings by which the attributes of information as an asset could be shown to impact on organisational performance. What it has shown is that there is a link, tentative as it may be, between information assets and organisational effectiveness. Any organisation which is concerned with achieving effectiveness must also be concerned with the management of its information assets. The leveraging of information assets requires more than technological solutions. It also requires attention to the long-term building of assets for future economic benefit.

9.2 Conclusions regarding aims and objectives
There appears to be a growing understanding of the intangible sources of value-creation in organisations which has broken down the barriers between traditional and non-traditional information assets. The aims and objectives of the research study could have benefited from a wider focus on value creation which encompassed a wider range of non-traditional assets. However, the relatively unexplored and sometimes controversial areas of information value and strategic information management, justify, in my view, a concentration on discovering how senior managers perceived information assets and their attributes. The senior managers interviewed were very aware of the issues they faced in terms of managing their information assets: they were restrained not by mindset but by limited financial resources and by the demands on their attention from customers and competitors.
9.3 Conclusions regarding the research findings within the context of the literature reviewed

What the literature suggests senior managers want from their information assets is very different to what they get. Senior managers are struggling to harness information assets in their organisations against a background of conflicting priorities and changing business environments. Increasing interest in e-business as a means of crossing physical and cultural business barriers has meant that senior managers have had to embrace technological developments while coming to terms with issues of communication, relationship management and the creative participation of employees. Many of the senior managers interviewed saw these as being the greatest benefits of information assets.

However, senior managers are struggling with traditional information assets such as customer information, directing all their attention to this area which impacts on their external effectiveness. Indeed, customer information assets were identified as being the most important information assets by the senior managers interviewed, with quality being the most important attribute. Information assets which could not be easily accessed or which contained limited or duplicated information were seen as liabilities rather than assets. This points to the conclusion that there will be little scope for planned value-creation from information assets unless more effective management is put in place.
9.4 Conclusions regarding the important findings of the research study
Managers do want opportunities to create and harness information assets and extract value from them. However, the research findings point to a less optimistic conclusion. Information assets such as Customer and Product information and attributes such as Quality and Utility are still at the forefront of senior managers' thinking. This suggests that the management of information assets is still at an operational rather than value-generating stage. The ability to compete with information as outlined by Marchand (2000) (see Exhibit 19) seems very much in the distance for the case study organisations studied, despite competitive advantage being one of their major concerns.

A link between information asset management and organisational performance has been identified. However, this is a tentative link and points to the conclusion that it may be some time before any evidence emerges for a conclusive relationship between information asset management and organisational performance. This is in part due to the lack of prior research in the organisational effectiveness area, although progress has been made in recent years.
9.5 Conclusions regarding limitations of the research and of the research findings and suggestions for further research.

The research study would have been simplified by a more clear-cut approach. However, the wide-ranging subject area that encompassed both information and accounting literature meant that it proved difficult not to take a multi-dimensional approach. The inductive exploratory approach, the variety of research methods and analysis approaches, the breadth of the literature review and the extended period of data collection all served to build an extensive but integrated research study. The limitations of the research and its findings were perhaps inherent in the research approach taken. However, it might be argued that such an approach could have benefits in other studies, highlighting as it did the views of an elite group of senior managers, while remaining focused on information assets and their management and role in enhancing organisational effectiveness.

Importance of the information asset-scoring grid

Importantly, the information asset and attribute scoring grid provided a novel approach to the identification and rating of a range of pre-selected information assets and attributes. The information asset-scoring grid is an innovative approach to identifying and scoring attributes of information assets and could be developed in a number of ways:

- The information asset-scoring grid could include dimensions of time and situation to provide context and explore a range of scenarios within an organisational context.
- The information asset-scoring grid is transportable, being housed on a laptop and uses a widely available software, Excel. It could be developed as a self-assessment tool with simple instructions for filling in the grid and generating bar charts providing immediate findings.
- The information asset-scoring grid could be used with a self-selected range of information assets and attributes to provide a tool for strategic planning, with perhaps a financial dimension, where managers can select which information assets to invest in over time and track the
potential impacts of such investment through attributes of information assets.

The information asset-scoring grid has enormous potential for future development. It provides a useful, interesting and innovative tool to collect a large amount of data from senior managers and present it to them in an immediate and visual way. As a departure from traditional presentations of information assets and attributes in textual form the grid represents a substantial development in the information as an asset domain and has great potential for future development.

Importance of the general model of the grounded theory of information assets for Case studies 1, 2, 3, and 4.

The general model of the grounded theory of information assets is important in a number of ways:

- The model highlights the hidden impacts for organisations (that is, decreased competitive advantage) which results from an exclusive focus on external effectiveness.
- The model highlights the need for organisations to view competitive advantage as a multi-dimensional concept dependent on a range of explicit and implicit factors that are not always readily apparent and indeed may only appear after a significant delay.
- The model suggests that insufficient management attention is given to long-term information assets by senior managers and that this limits value creation from information assets.
- The model highlights the need to build awareness among senior managers of the impact of internally-generated information assets on long-term external effectiveness.
The general model of the grounded theory of information assets highlights the need for organisations to focus on both the tangible and intangible drivers of their business if long-term organisational effectiveness is to be achieved.

Suggestions for further research
The goal of research is ultimately to create the momentum for further research to be carried out. Creating interest in a research area so that others can ask questions that take the research a step further is the most rewarding aspect of carrying out any research study.

Further work could develop the current research to benefit a much wider and more diverse group of organisations. Suggestions include:

- Further case studies with information-intensive UK organisations, both in the public and private sectors, to test the validity of the findings and gather more extensive interview data.
- Follow-up interviews with existing case study organisations to identify any progress in their information asset management.
- A study in the Nordic countries, identified by Fincham and Roslender (2003) as being further progressed in the treatment of intangible assets than the UK, might highlight the steps to developing an information asset management capability and reporting framework in the UK.

However, it is clear that a more wide-ranging qualitative study of information-intensive UK organisations which deals more broadly with the issues of information assets, intangible assets and the creation of business value are the greatest area of potential for further research.
9.6 **Summary**

Conclusions regarding the research aims and objectives, the research findings within the context of the literature review, the important findings of the research, the limitations of the research and of the research findings have been drawn. The importance of the development of the information asset-scoring grid has been highlighted. Suggestions for further research have been made and a more wide-ranging qualitative study of information-intensive organisations, focusing on the creation of business value, has been proposed as the most appropriate area for development.

9.7 **Conclusion**

For senior managers and their organisations to address competitive advantage for the long-term, they must do more than recognise the strategic importance of information assets. What is required is an assimilation of practices which do not exclude "soft issues" from bottom line priorities. To achieve this leadership is required, not just from industry leaders but from government, in providing clear direction and by developing new methods to link information assets, people and competitive advantage. This link is ultimately demonstrated in the relationship between information assets and organisational performance which, tentative as it may be, is a significant step forward in improving our understanding.
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APPENDIX
Interview schedules
The attributes of information as an asset, its measurement and role in enhancing organisational effectiveness

Explanatory Statement:

Information assets comprise “data that is or should be documented and which has future economic benefit”.

An example of an information asset might be as concrete as a customer database or as abstract as employee know-how.

Please note that the term “asset” is used to signify something of future economic benefit and is not used simply in its conventional accounting sense.

Theme 1: Who is responsible?

Yes/No

(a) Does your organisation have a: Chief Executive  
Finance Director  
Marketing Director  
Information Services Director  
Personnel Director  

(b) The management of information assets in your organisation is the responsibility of:

Chief Executive  
Finance Director  
Marketing Director  
Information Services Director  
Personnel Director  
OR  
Information Manager  
Chief Knowledge Manager  
Department Head  
No one  
Other- Please specify

(c) Who is involved in actively managing information assets in your organisation?
**Theme 2 – What is the role of information assets?**

Please indicate the extent to which you agree that the following organisational activities are dependent on related information assets by circling the appropriate number against each, using the scale below:

<table>
<thead>
<tr>
<th>The following organisational activities are dependent on related information assets:</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neither disagree nor agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Achieving control</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>b. Cost savings/ Enhancing efficiency/productivity</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>c. Enhancing effectiveness</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>d. Research and development</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>e. Operational management</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>f. Customer services</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>g. Competitive intelligence</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>h. Staff management</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>i. Strategic management</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>j. Other – please specify</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Theme 3: Identifying information assets

a. Have you identified any or all the information assets in your organisation that you consider important? If the answer is yes please go to b, if the answer is no please go to question 5.

Yes ☐
No ☐

b. What are these information assets and why are they significant in your view?

<table>
<thead>
<tr>
<th>Information Assets</th>
<th>Significance</th>
</tr>
</thead>
</table>

Theme 4: What are the mechanisms used for identifying information assets?

What mechanisms are used by your organisation to identify information assets?

----------------------------------------------------------------------------------------
----------------------------------------------------------------------------------------

Theme 5: What problems are perceived in identifying information assets?

a.) If you have not identified information assets in your organisation, is the reason:

1) Too difficult ☐
2) Too expensive ☐
3) Not important ☐
4) Not justified ☐
5) Not useful ☐
6) Other ☐

Please tick as many as apply.

b.) Do you consider that the identification of information assets will become more important, less important or remain unchanged over the next five years?

More ☐
Less ☐
Unchanged ☐

c.) Why?
Questions

1. The value of information is increasingly recognised but its measurement is still far from satisfactory. Do you think real progress has been made in the measurement of the value of information or is it an impossible task? Is it even necessary to obtain a value for information assets in an organisation?

2. The concepts of knowledge management and intellectual capital are now widely known and used in the business environment. Do you think they have had a real impact in improving the management of information and highlighting the role of information professionals?

3. Many organisations are good at acquiring and using information. Where they still seem to struggle however is in embedding lessons learnt from information acquisition and use, especially in business systems and business processes. Do you think that organisations might benefit from distributing responsibility for embedding good practice in information management to all employees? How could it be achieved? What might such a move mean for the information profession?

Are there sectors where these questions are more relevant and important and others where the questions posed above are not of importance?
4. Of the following information assets listed below, please describe their most significant attribute for you when used in your day to day work. (The word “asset” is used to signify something of future economic benefit and is not used simply in its conventional accounting sense).

<table>
<thead>
<tr>
<th>Information Assets</th>
<th>Attributes (for example, accuracy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer information</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Competitor information</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Product information</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Business processes</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Management information</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>People management</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Supplier information</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Legal and regulatory</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Organisational information</td>
<td>-----------------------------------</td>
</tr>
</tbody>
</table>

5. Do you think better information management can improve an organisation’s effectiveness? Will organisations which do not apply themselves to identifying and harnessing their information be less successful than those who do? Can this be measured?

6. Finally, do you think that identifying and measuring information and its value will have a positive impact on the perception of information by senior managers? Or is a culture of assessment diverting attention from the dynamic role which information plays in organisations and even perhaps curtailing its creative applications?

Are there any other points you would like to raise?
Case study Interview Schedule

The attributes of information as an asset, its measurement and role in enhancing organisational effectiveness

Explanatory Statement:

Information assets comprise "data that is or should be documented and which has future economic benefit".

An example of an information asset might be as concrete as a customer database or as abstract as employee know-how.

Please note that the term "asset" is used to signify something of future economic benefit and is not used simply in its conventional accounting sense.

Theme 1: The organisation and information strategy

Question 1.

Do you agree or disagree with the following statements, for your organisation?

Please explain why you agree or disagree.

a) Information assets are major assets of the organisation.

b) Information assets must be managed as major assets of the organisation.

c) Information investments should be made only in support of the organisation's goals and objectives.

d) Senior managers and employees throughout the organisation are custodians of the information assets they use.

423
e) Senior managers and employees have a major responsibility, within corporate constraints, to use information assets effectively and efficiently and to share them internally and externally.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither Agree nor Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
</table>

f) Users are responsible for the planning and control of the information assets they use.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither Agree nor Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
</table>

g) There is a formal management approach to the management of life cycle phases of information assets, beginning with creation and following through to retirement or disposal.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither Agree nor Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
</table>

Question 2.

a) Do information assets feature on the management agenda?

   Yes ☐
   No ☐

b) In management meetings, do you discuss the value of information assets?

   Yes ☐
   No ☐

c) If the answer to Question 2 (b) was Yes, What issues are raised?

d) If the answer to Question 2 (b) was No, please describe why you think the value of information assets is not discussed.

e) Do you put any monetary value on information assets?

f) Do you rank the value of information assets?
Theme 2: The organisation and effectiveness

**Question 3.**

a) Would you describe your organisation as an effective one?

Yes ☐

No ☐

b) What does the term “organisational effectiveness” mean to you and your team?

c) Is your organisation becoming more or less effective in your view?

d) What is the role of information assets in enhancing your organisation’s effectiveness?

Theme 3: Identifying information assets

**Question 4.**

a) Has your organisation identified categories of information you consider significant for the business?

Yes ☐

No ☐

b) If the answer to Question 4 (a) was yes, please describe what the information assets are.

c) What are the most significant attributes of the information assets you have identified?

d) What mechanisms are used by your organisation to identify information assets?

e) What policies are in place to manage and protect them?

f) Please estimate the cost to your organisation of replacing these information assets and the current level of investment in them.

g) If the answer to Question 4 (a) was no, is it because identifying information assets is:

1) Too difficult ☐
2) Too expensive ☐
3) Not important ☐
4) Not justified ☐
5) Not useful ☐
6) Other (please specify) ☐

*Please tick as many as apply*
Theme 4: Using information assets

Question 5

Please think of a non-routine decision you have made in the previous few months at work. For that decision:

a) What categories of information did you use?

b) What categories of information would you have liked to have used?

c) Was the decision a success in your view? Please justify.

d) Since you made your decision, has the outcome affected your perception of the value of the information used?

Theme 5: Measuring the effects of information assets

Question 6.

a) Does your organisation measure the contribution information assets make to the business?

   Yes □

   No □

b) If the answer to Question 6 (a) was yes, how is this achieved?

c) If the answer to Question 6 (a) was no, can you suggest any ways in which your organisation might begin to measure in this area?

Finally, do you consider that the identification and management of information assets will become more important, less important or remain unchanged over the next five years?

MORE □ LESS □ UNCHANGED □

Why?

Is there anything else you would like to add?