INFORMATION MANAGEMENT:
BEST PRACTICES IN BROAD BASE INDUSTRIES

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Dedication

In memory of our family members we lost in 1992 – 1995 Bosnian war

Abstract

Many organisations recognise the importance of Information Management (IM) and are implementing it into the structure and culture of their organisation and the roles of their managers and employees. More and more, organisations are thinking and operating strategically – their very survival depends on information. Information is the lifeblood of an organisation. An essential part of any business strategy is consideration of how information systems strategy supports change. Experts agree that information management has become a competitive necessity for all types of companies. The organisations that will succeed in the global information environment are those that can identify the value of information. One of the biggest problems facing managers today at all levels is the problem of investing in and using technology efficiently, especially Information Technology (IT). Business intelligence enables organisations to make well informed business decisions and thus can be the source of competitive advantages. This is especially true when companies are able to extrapolate information from indicators in the external environment and make accurate forecasts about future trends or economic conditions. Business intelligence becomes a top initiative and investment priority for Chief Information Officers (CIOs) and Chief Executive Officers (CEOs).

This dissertation addressed the need to identify the most important information management components as a foundation for the more in-depth discussion on information management principles and best practices in broad base industries. The elements of information management that appear the most frequent in the literature study indicate that authors place high priority on the following components:

- Information security
- Information management governance
- IT standardisation
- Regulatory requirements for information management
- Business intelligence
- Virtual collaboration
- Management of service outsourcing
- Selection of service providers
- Project management
- Change management

- Risk management
- Asset management
- Knowledge management
- Business processes
- Balanced scorecard
- Benchmarking
- Competitive Intelligence
- Business partnering

The empirical study was conducted in six phases. The first phase consisted of establishing a framework of information management best practices in broad base industries and the second phase was to develop a preliminary measuring instrument to investigate the perceptions of the sampling population on information management best practices. Phase three consisted of a pilot study in the development of a questionnaire.

Phase four was to investigate perceptions of information management best practices in broad base industries. The analysis model was developed based on the criteria evaluated using advanced statistical procedures. The five most important components of information management that were identified were Business processes, Information security, Business intelligence, Risk management, and Information management governance. The best practices for these five most important components of information management were also identified. The five highest ranking best practices were: Virus control implemented; Information management strategy aligned with business goals; Documented business processes; Risk management framework implemented; and Support and training in place. Phase five was to describe the results of the empirical study for information management best practices in broad base industries. Phase six was to compare the perception what the information management best practices are as perceived by companies from broad base industries. The most uniform perception was identified for the information management component 'Business Intelligence'. On average, it was rated almost equally by all participants. On the other hand, there is a significant difference in perception from all industry segments and the whole industry for 'Risk Management'.

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CHAPTER 1: INTRODUCTION

"Information is often treated as if it were as free as the air that we breathe and it comes as a shock if we have to pay for it or if someone gets proprietorial and refuses to give the information that we ask for".

- Roger Evernden

1.1 Background

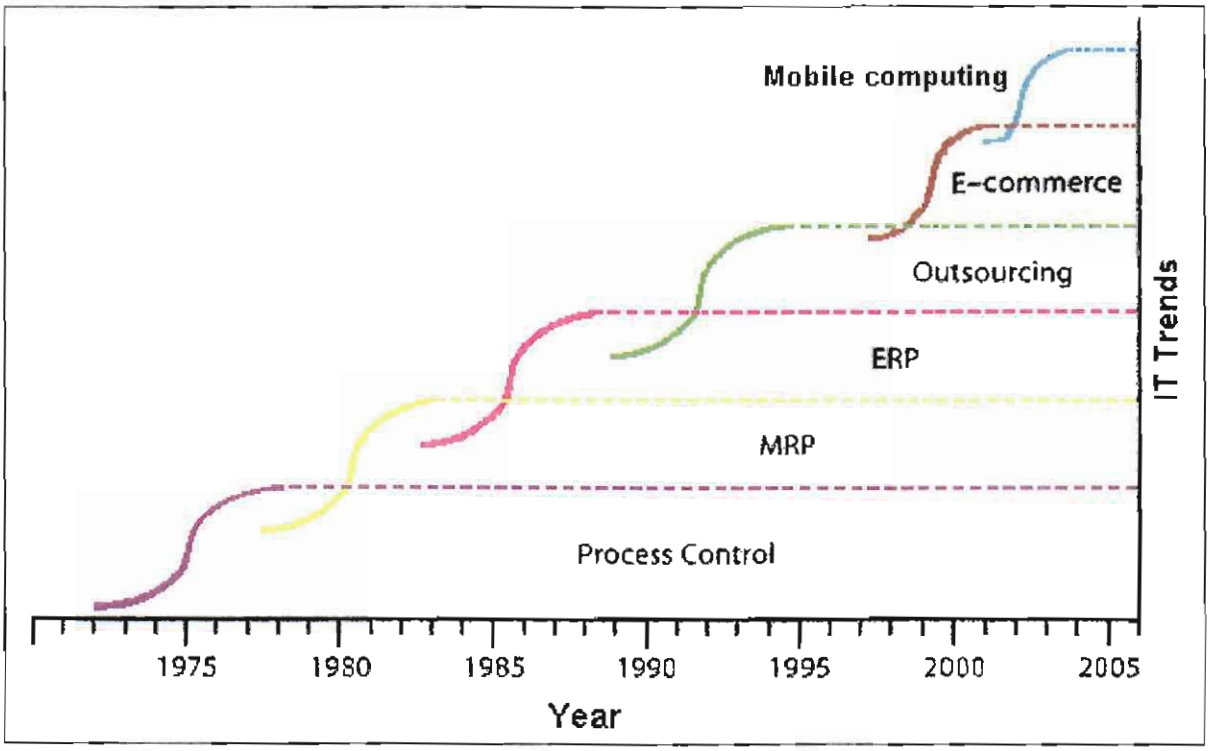
An information based society has arrived; the organisations that will succeed in the global information environment are those that can identify and value, create and evolve their information assets (Corbitt, 2004:32). Along with the financial and human resources, information is being recognised (Evernden & Evernden, 2003:7) as a vital asset that should be managed effectively by establishing a special team responsible for information in the same way that there are groups responsible for financial accounting and personnel. Information Management (IM) is concerned with the exploitation and development of the information assets of an organisation with a view to furthering its objectives. Information management entails all of the processes associated with identification, sharing and creating information. This requires systems for the creation and maintenance of information repositories as well as cultivation and facilitation of information sharing (Corbitt, 2004:32). The information management emphasises the quality, strategic business value, and security of an organisation's information systems (O'Brien, 2004:8).

Many organisations recognise the importance of information management and are implementing it into the structure and culture of their organisation and the roles of their managers and employees. For many enterprises, information and the technology that supports it, represents their most valuable but often least understood assets. Successful enterprises recognise the benefits of Information Technology (IT) and use it to drive their stakeholders' value. These enterprises also understand and manage the associated risks, such as increasing regulatory compliance and critical dependence of many business processes on IT.

Crow (2003:175) used an example of the chemical industry to explain the use of IT over the past three decades. The **Figure 1.1** on page 2 shows six different periods regarding

the IT and the chemical industry. As early as 1948 there was speculation about running a computer controlled plant. It was followed by Material Requirements Planning (MRP) technologies. Despite the small, but growing, penetration of "process" MRP tools in the industry sectors, there was an increasing and often quite vocal dissatisfaction with the limitation of these early technologies. Enterprise Resource Planning (ERP) systems began its international expansion effort in earnest in the mid-1980s. Many functions unique to the business environment were gradually supported by this software, including regulatory compliance, tools and exchanges, and process environment.

Figure 1.1: IT in the industry over the past three decades



Source: Adapted from Crow (2003:191)

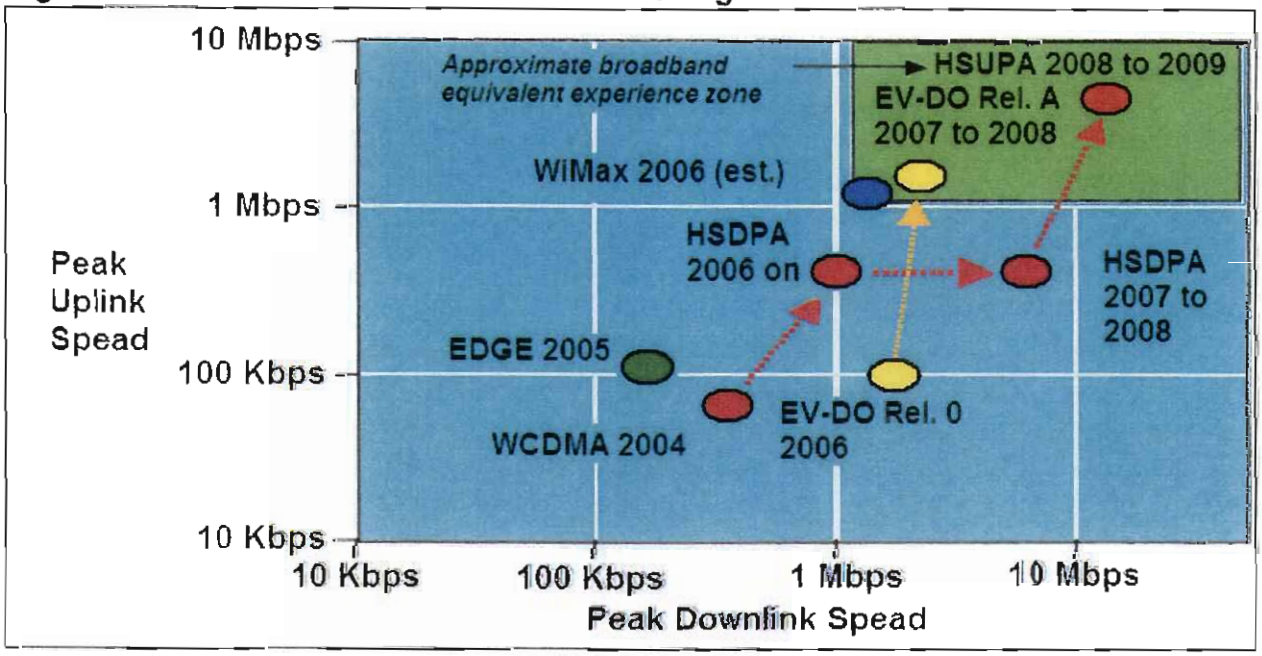
As more companies turned to commercially available packages, outsourcing of IT tasks won favour as companies recognised that the implementation of large systems such as MRPs was beyond the scope of their internal IT resources. In the conventional "one-to-one" outsourcing scheme, teams of IT professionals outsourced to an external service provider continued to handle applications management, run help desks, and execute core IT tasks for their former employer. According to Kern and Wilcocks (quoted by Suomi & Tähkäpää 2004:371), outsourcing is seen in many organisations as a means to get rid of everything unpleasant or unknown. The outsourcing is good in some cases but in other cases it is also a way to lose even the last understanding and control of the outsourced activity. The solution is not as simple as it might sound. Many firms have

made sourcing decisions based just on anticipated cost saving without further consideration of its effects on strategies of technological issues. In the case of outsourcing, it is very hard to bring the applications back to the company. Key aspects of the firm's technical and managerial competence will have evaporated since the outsourcing deal was accomplished (Applegate, Austin & McFarlan, 2005:36).

In 1998 a growing number of companies began to adopt Internet technology through broad e-initiatives that contained e-commerce pilot programs or information-oriented web sites. The level of e-commerce activity in the industry sector was extraordinary, reflecting both the potential size of the prize and the uncertainty felt by all the major players about which models and methods will prove successful in the long run (Crow, 2003:189).

Among all the technological innovations, one of the most disruptive, yet potentially attractive for companies is mobile computing. The companies are already facing a number of opportunities in internal communication and collaboration, as well as improved supply chain efficiency. They are offered a wide range of new mobile services, but face social challenges of mobile working plus new costs. The **Figure 1.2** below shows the theoretical peak speeds of selected wireless technologies. It is predicted that Global System for Mobile (GSM) networks won't achieve an approximate equivalence to 2 Mbps wired broadband until High Speed Uplink Packet Access (HSUPA) networks and client equipment become available, starting in 2008 to 2009 (Jones, 2006).

Figure 1.2: Future trends in wireless networking



Source: Adapted from Jones (2006)

It is unfortunate that the word information is included in the phrase 'IT', because people so often assume that to be involved in information means that one is a computer specialist of some sort or another. It is not surprising, therefore, that information management is seen as the prerogative of the technology department, whereas responsibility for information should be much broader, and to some extent rests with everyone in the organisation. Much information is never stored or manipulated using technology and it is the people who use information who really understand the business models that are used to analyse and interpret information. Evernden and Evernden (2003:12) have indicated that information management is exposed to a very wide range of issues outside the IT area. They include issues within the enterprise such as HR policy, financial investment planning and change management.

1.2 Problem statement

More and more, organisations are thinking and operating strategically – their very survival depends on information. In order to compete and survive in the current marketplace, most companies recognize the fact that information and the systems supporting information are important business assets for establishing and leveraging information-based resources and competence.

The companies are exposed to the number of challenges regarding information management best practices. When addressing the information management strategy for example, several key questions needs to be answered (Marks, 2006:38):

- What needs to be protected? What are the information assets that are most critical to business objectives, to fulfil the transactions the business conducts, and to run business operations?
- What needs to be prevented? What are the threats and vulnerabilities that would permit information to be lost, damaged, destroyed, inappropriately altered, or revealed to unauthorized parties?
- What is the likelihood that any given threat or vulnerability will be realised? And how should these risks be prioritised to protect critical assets?
- If a threat is realised, what will be the cost? Can the company tolerate it? If not, what actions need to be taken to mitigate the risk and manage the cost?
- If a company opts not to take action against a perceived threat, how can it manage this exposure or residual risk within acceptable risk-tolerance levels?

An organisation needs to have duly designed and implemented management structures and use information management best practices to protect its information asset, which is very important to the organisation and can serve as a powerful weapon to survive a highly competitive environment (Chang & Ho, 2006:345). The information management community knows its business – policies, procedures, information classification structures, retention and deposition schedules, essential records, disaster recovery planning, and even electronic record management. But information professionals do not typically know and understand the concern of the executive in the organisation – the decision maker (Meagher, 2002:26). One must come to understand how information management and business are fundamentally interconnected and how strategic thinking creates a critical link between information management and business.

This study focuses on the understanding of information management in broad base industries and provides a framework for organisations to use the best practices when implementing information management solutions. The constant search for the information management best practices will help business executives to take important steps on the path of information management enabled transformational change. At the same time it will help information management executives not just in defining and executing technology strategy, but also in defining and executing business strategy.

1.3 Objective of the study

The main objective of this study is to evaluate theory and investigate the perception of Information management best practices in broad base industries. To achieve the main objective of the study, the secondary objectives of the study are as follows:

1.3.1 Theory evaluation:

- Provide an overview of the origin of information management best practices.
- Establish a framework of information management best practices in broad base industries.

1.3.2 Investigate perceptions of information management best practices:

- Develop a preliminary measuring instrument to investigate the perceptions of sampling population on information management best practices.
- Describe the information management best practices.
- Compare the perception what the information management best practices are as perceived by companies from broad base industries, from primary, secondary and tertiary sector and the industry as a whole.

1.4 Demarcation of the field of study

A sample of more than 100 people consisting of managers and specialists from IM/IT, financial and business management background, employed in different industries will be drawn. The targeted population will be from South African's companies as per handbook *'Top 300 national companies'* (Fletcher, 2005). The study will be limited to the data commonly found on the Internet, data found in primary and secondary sources within South African borders and a timeline of 31 October 2006.

1.5 Research methodology

Information will be acquired from both primary and secondary sources.

1.5.1 Primary sources

Information will be gathered by means of an empirical study. Respondents will be requested to complete a questionnaire. The questionnaire will comprise five-point Likert-type and open-ended questions. The questions will be formulated according to a model established during the literature study. Struwig and Stead (2004:94) described a Likert-type scale as a measure of attitudes or perceptions where 5-point or 7-point scales are often used. In respect of each question, respondents have to indicate the degree to which they agree or disagree with its content on, say, a five-point scale (for example, strongly differ, differ, undecided, agree, strongly agree). Respondents will be assured that the information obtained will be treated as confidential and that results will be used for research purpose only.

1.5.2 Secondary sources

Useful information will be obtained from various publications such as textbooks, journals and previous studies on the subject. Information not obtainable from publications that are relevant to the specific study purpose will be gathered through the use of questionnaires directed at the target group of this study.

1.5.3 Research design

Due to the exploratory nature of this study, hypotheses will not be formulated. The study's emphasis will be on discovering best practices in information management from the business' viewpoint, rather than on the confirmation of prior research.

1.5.4 Questionnaire design

The questions will be formulated according to a model established during the literature study. The questionnaire will comprise of four sections. The first section (section A) will request functional data from participants. The second sections (section B) of the questionnaire, using Likert-type five-point scales, will focus on the respondents' views about information management best practices at their workplaces and how they perceive ideal information management best practices in business. The third section (section C) will request information about the type of industry and the fourth section (section D) will be used to get information about the company name. Two experts from the information management field will determine whether the items reflect the model that was selected and whether additional items need to be included.

A pilot survey will be conducted to test the questionnaire empirically. A random sample of 30 respondents employed in the broad base industry will complete the questionnaire. The pilot study will indicate whether they do not understand the questionnaire's instructions, the meaning of the questions, and the meaning of any words in the questionnaire.

1.5.5 Sampling method

A hybrid–sampling method that incorporates aspects of both probability and non-probability sampling methods will be used for this study. A hybrid-sampling plan will involve the selection of the sample by means of two distinct phases. First, a random sample of respondents from the broad base industries will be selected. Second, quota sampling will be used to cover three groups connected to information management:

- Information management and IT managers and specialists;
- Chief Financial Officers (CFOs) and financial specialists, and;
- Chief Executive Officers (CEOs), operations managers, maintenance managers, plant managers, marketing managers and other personnel from business units.

1.5.6 Data analysis procedure

Descriptive statistics will first be used to get baseline data. Thereafter, advanced statistical procedures will be used to investigate the differences between the experiences of respondents' towards information management best practices in the workplace and how they perceive the best practices. The selection of specific statistics will be determined once the questionnaire has been constructed.

1.6 Division of chapters

The study will be divided into six chapters as follows:

- Chapter 1 will indicate the scope of the study and methods used. It will include: an introduction; problem definition and objectives; a description of the methodology (including the research methodology, the scope of the study and the sampling procedure).
- Chapter 2 will explore the literature on the role of information management in the broad base industry, beginning with a brief historical account of the origin of information management and progressing through a number of developments to contemporary information management issues and concerns in the broad base industries.
- Chapter 3 will focus on the information management principles and best practices. A model of the principles and best practices of information management will be developed.
- Chapter 4 will outline the methodology of the empirical study. The design of the questionnaire, the sample design, the sample size, and the processing and the analysis and evaluation of data will be outlined.
- Chapter 5 will give an exposition of the empirical information on the respondents; perceptions of information management best practices in the broad base industry.
- Chapter 6 will present a summary of the most important findings of the study, a discussion of the conclusions reached and suggestions for future study.

1.7 Summary

Information management personnel are exposed to a number of challenges. They have a challenge how to align information management strategy to the business plan, to the firm's business processes, and to senior management's strategic business plans. Information management is, after all, supposed to serve the organisation. Many organisations recognise the importance of information management. For many enterprises, information and the technology that supports it, represents their most valuable but often least understood assets. The task of information management is to optimise the use of available resources, including applications, information, infrastructure and people. The information management specialists must come to understand how information management and business are fundamentally interconnected and how strategic thinking creates a critical link between information management and business. They need to understand what the best practices in information management are and how to use them in their organisations to satisfy the quality, and security requirements for the company's information.

1.8 Terminology clarification

The list of acronyms used throughout this study is given in **Table 1.1** below.

Table 1.1: List of acronyms

Acronym	Description
ACM	Association for Computing Machinery
AIIM	Association for Information and Image Management International
ANSI	American National Standards Institute
ASP	Application Service Provider
BI	Business Intelligence
BSC	Balanced Scorecard
CD	Compact Disk
CEO	Chief Executive Officer
CFO	Chief Financial Officers
CI	Confidence Interval
CIO	Chief Information Officer

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CMM	Capability Maturity Model
CMMI	Capability Maturity Model Integration
COBIT	The Control Objectives for Information and Related Technology
CoP	Code of Practice
COSO	Committee of Sponsoring Organisations
CPM	Corporate Performance Management
EA	Enterprise Architecture
EC	Electronic Communications
ECT	Electronic Communications and Transactions
EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
EVA	Economic Value Added
GSM	Global System for Mobile
HSUPA	High Speed Uplink Packet Access
IAM	Information Asset Management
IISP	Information Infrastructure Standards Panel
IM	Information Management
IRR	Internal Rate of Return
IS	Information System
ISF	Information Security Forum
ISO	International Organisation for Standardization
ISP	Internet Service Provider
IT	Information Technology
ITIL	Information Technology Infrastructure Library
KM	Knowledge Management
KMS	Knowledge Management Systems
MD	Managing Director
MRP	Material Requirements Planning
NCITS	National Committee for Information Technology Standards
NPV	Net Present Value
OGC	Office of Government Commerce
OLAP	Online Analytical Processing
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
PMO	Projects Management Office
R&D	Research and Development

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RFP	Request for Proposal
RICA	Regulation of Interception of Communications and Provision of Communication-related Information Act
ROA	Return on Assets
ROCE	Return on Capital Employed
ROI	Return on Investment
RONA	Return on Net Assets
SAM	Software Asset Management
SEC	Securities Exchange Commission
SEI	Software Engineering Institute
SMS	Short Messaging System
USA	United States of America
W3	World Wide Web Consortium

CHAPTER 2: ROLE OF INFORMATION MANAGEMENT IN BROAD BASED INDUSTRY ORGANISATIONS

"Different levels of management and users will perceive the value of IT differently".

- Wim Van Gremberger

2.1 Introduction

Within this section, the role of Information Management (IM) in an organisation is discussed as a foundation for the more in-depth discussion on information management best practices in broad base industries. The broad base industries consist of primary, secondary and tertiary industry sectors. Mining, oil and gas for instance belong to the primary sector. The secondary sector consists of basic and general industries. The tertiary sector includes utilities (electricity, gas and water), financial and business services, transport and communications, and IT. For the discussion of information management best practices it is imperative to understand what information management is, what are the technologies employed, what is the value of information, the risks involved with information management investments and how these risks can be managed. It is also important to discuss the new trends that are emerging in the information management domain. Although this section discusses information management in general, more emphasis is placed on the role of information in decision-making process.

2.2 Defining information management

There is now an increasing interest in information management: the creation, capture, deployment sharing, use, development, evaluation and exploitation of information. Many organisations have appointed information managers responsible for all stages of the creation, capture, deployment, use, sharing, development and evaluation of information and the way these fit into the information cycle. Information management has been seen by Corbitt (2004:32) as an end-to-end process from identifying information requirements and gaps, through information creating, the sharing and packaging of information.

Information management relates to management activities concerning information (Skyrme, 2004:150). It can be described as getting the right information, to the right person, in the right format, at the right time. Corbitt (2004:32) states that the challenge is to select what is the most relevant and best practice and to turn this into job support tools that will assist comprehension and increase individual productivity and team performance in areas such as winning more business and building better customer and supplier relationships. The management of information is the philosophy in which information is managed as a strategic resource with the aim to create competitive advantage. Information management encompasses a huge realm, far beyond someone simply knowing where to find a piece of data at any given time (Marks, 2006:34).

Information management is a broad term that encompasses several activities such as information security, backup and recovery, data quality and sharing. The necessary elements for successful implementation of information-management include common policies, processes and procedures, professional and ongoing education, development of staff, and a common enterprise system. Information management is a method of supporting organisations in the environment they face in the 21st century. Corbitt (2004:32) contends that information has become the main competitive tool for many businesses and that currently it is the only meaningful economic resource having overtaken both capital and labour in importance. This view suggests that information management needs to confront the realities of the situation within the organisation. It needs to be seen as a discipline that directs and supports effective and efficient management of information to the organisation, ensuring that the long-term goals of the organisation are met. Organisations that succeed in information management will view information as an asset and will develop organisational norms and values which support the creation and sharing of information. Information can be seen as a function that aims to utilise information as a competitive lever by bringing stakeholders together. It is defined as the sum of information management governance, business information requirements, IT architecture and supplier's management.

2.3 Value of information

Information must have certain benefits over raw data to be considered a value added resource to the organisation. There are certain characteristics that information should

have in order to be useful and of value to the organisation. These characteristics are (Smit, de J Cronje & Brevis, 2002:176):

- Quality (accuracy). Information is of high quality if it portrays reality accurately. The more accurate information, the higher its quality.
- Relevance. Managers and employees often receive information that is of little use. Information is only relevant when it can be used directly in problem–solving and in the decision- making processes.
- Quantity (sufficiency). Managers and employees often complain about an information overload. Quantity is the sufficient amount of information available when users need it – more is not always better.
- Timeliness (currency). Timeliness means the receipt of the needed information while it is current and before it ceases to be useful for problem-solving and decision-making. Receiving information too late can have a detrimental impact on an organisation.

Information must be accurate, relevant, sufficient and current. These characteristics interrelated are essential to the provision of information that serves as a value-added managerial resource (Smit *et al.*, 2002:176). Information can exist and be expressed in many forms, for example, facts, attitudes, opinions, issues, values, theories, reasons, processes, policies, priorities, rules, cases, approaches, models, tools, methodologies, relationships, risks and probabilities. Responses and initiatives in a particular situation may require the assembly and deployment of various types of information.

Information is the knowledge derived from data that has been transformed to make it meaningful and useful (Hellriegel, Jackson & Slocum, 2002:543). Information comes from all directions and in all forms: in paper, voice and electronic forms as images, charts, notes taken on a white board during a meeting, tables contained in reports, titbits of industry information contained in a trade journal and everyday business memos. Whenever one takes action or makes a decision one needs information, but different types of information are needed for different situations. Information changes over time: new information emerges, while some becomes out-of-date and irrelevant. Time qualifies information. Information is time-sensitive. Every item of information should be associated with a time attribute that identifies the time period for which the information item is valid. Information that is outdated, inaccurate, or hard to understand would not be very meaningful, useful, or valuable to users. People want information of

high quality, that is, information products whose characteristics, attributes, or qualities make the information more valuable to them. The summary of important attributes of information quality is given in Table **2.1** below. Information means different things to different people; for example, most managers tend to value practical know-how and stress the sensitivity, awareness and familiarity that come with experience. Academics on the other hand tend to focus on theoretical understanding and value acceptable additions to what is already known about a particular topic. Some sources of information may be, or appear to be, more reliable or authoritative than others. And often people may disagree on what is best. Almost every industry sector – from finance, banking and insurance, through retail and wholesale, to travel and transportation, manufacturing, media, government and public service, not to mention healthcare, pharmaceutical, biotechnology, education, telecommunication and the utilities – has an increasing reliance on quality information for both survival and success. Each of these industries collects and uses vast quantities of data (Evernden, & Evernden, 2003:8).

Table 2.1: Summary of important attributes of information quality

INFORMATION DIMENSIONS	INFORMATION ATTRIBUTES
Time dimension	
Timeliness	Information should be provided when it is needed.
Currency	Information should be up-to-date when it is provided.
Frequency	Information can be provided as often as needed.
Time period	Information can be provided about past, present, and future time periods.
Content dimension	
Accuracy	Information should be free from errors.
Relevance	Information should be related to the information needs of a specific recipient for a specific situation.
Completeness	All the information that is needed should be provided.
Conciseness	Only the information that is needed should be provided.
Scope	Information can have a broad or narrow scope, or an internal or external focus.
Performance	Information can reveal performance by measuring activities accomplished, progress made, or resources accumulated.
Form dimension	
Clarity	Information should be provided in a form that is easy to understand.

Table continues on page 16.

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Detail	Information can be provided in detail or summary form.
Order	Information can be arranged in a predetermined sequence.
Presentation	Information can be presented in narrative, numeric, graphic, or other forms.
Media	Information can be provided in the form of printer paper documents, video displays, or other media.

Source: O'Brien (2004:261)

Data are raw facts or observations typically about physical phenomena or business transactions. The information can be defined as data that have been converted into meaningful and useful context for specific users (O'Brien, 2004:13). One tends to use the terms "data" and "information" interchangeably, although there is a definite distinction between the two concepts. Data refers to raw, unanalyzed number of facts about events or conditions from which information is drawn. Information on the other hand, is processed data that is accurate, and relevant to a particular situation. Information is the ability to furnish critical data on product performance, process parameters, and cost to internal groups such as research and development (R&D) and to external customers, who then use the data to improve their own operations or products.

Information is often treated as if it were a free commodity, such as the air that one breathes, and it comes as a shock if one has to pay for it, or if someone gets proprietorial and refuses to give the information that is asked for. Customers expect easy access to information about products and services, opening times, locations, items in stock, and fast response to queries – which means that information is important for survival. A 2003 study by the School of Information Management and Systems at the University of California, Berkeley, estimated that in 2002 alone about five hexabytes of new information were created and stored in print, film, magnetic and optical storage media. Ninety-two percent of that was stored on magnetic media, mostly hard disks. Five hexabytes are equivalent to the information contained in "half a million new libraries the size of the Library of Congress print collections," according to the study's executive summary (McCune, 2006:10). The cost of information can reflect factors such as reputation, exclusivity and supply and demand. The time taken to respond will vary and choices and trade-offs will need to be made. Another important aspect of reality is that information can be stolen - so organisations must take steps to protect themselves

against information theft both from within and outside the organisation. When planning the budget for projects one expects to include people, equipment and accommodation costs. In stark contrast, the cost of acquiring, storing, distributing or using information are often hidden, buried within other expenses, and so one is unaware of the cost of each piece of information.

When information is used effectively it becomes a key organisational resource of the information age (Evernden & Evernden, 2003:14). Information is a corporate asset and as such should be managed and marketed from a business rather than technology perspective. In order to make sound business decisions, managers rely on a steady stream of reliable, accurate, and timely information (Smit *et al.*, 2002:171).

2.4 Organisation and information management

In today's data overloaded business environment, experts agree that formal information management, also known as information stewardship, has become a competitive necessity for all types of companies. The intelligent organisation is one that is skilled at marshalling its information resources and capabilities, transforming information into knowledge, and using this knowledge to sustain and enhance its performance in a restless environment. Higher level managers typically are interested in information on overall organisational performance and new products' ideas. Every aspect of organisational functioning depends on information processing of one form or another (Applegate *et al.*, 2005:64).

According to De Sutter (2003:308), the term organisation has at least three different meanings:

(1) An organisation is a collection of human, material, informational and financial resources, for example a company: a corporation or a public service.

(2) Organisation is the activity of organising.

(3) The term organisational operations are also how things are done in an organisation. This is preferably the result of an organisation (2) activity but can also be the result of a historical process. In this meaning the term organisation is a set of (formal or informal) rules.

From a technical point of view (Laudon & Laudon, 2003:73) the organisation can be seen as a stable, formal, social structure that takes resources from the environment and processes them to produce outputs. From the behavioural view it is a collection of rights, privileges, obligations, and responsibilities that are delicately balanced over a period of time through conflict and conflict resolution. The technical and behavioural definitions of organisations are not contradictory. Indeed they complement each other: the technical definition tells us how thousands of firms in competitive markets combine capital, labour, and IT, whereas the behavioural model takes us inside the individual firm to see how that technology affects the organisation's inner workings (Laudon & Laudon, 2003:73).

The lessons from managers in the field suggest that a new organisational model is emerging that harnesses the power of today's technologies in the hands of a more knowledgeable workforce to create networks of organisations that can act big and small at the same time (Applegate *et al.*, 2005:77). Pellissier (2001:58) has indicated that within the extended boundaries of fierce global competition, changing markets and technological breakthrough, the following distinct characteristics emerged for the organisation of the future:

- It is information based.
- It is decentralised, yet closely linked through technology.
- It is rapidly adaptable and extremely agile.
- It is creative and collaborative, with a team-based structure.
- It is staffed by a wide variety of knowledge workers.
- It is self-controlling on the basis of shared operating principles and real trust.

With the advances and the dependencies that companies are placing on technology, having an effective Chief Information Officer (CIO) is more critical than ever before (Sisco, 2001b:2). The relationship between organisations and information technologies described by Laudon and Laudon (2003:73) can be seen as complex mediated by many factors, including the organisational culture, bureaucracy, politics, business processes, and pure chance.

2.5 Information management and business strategy

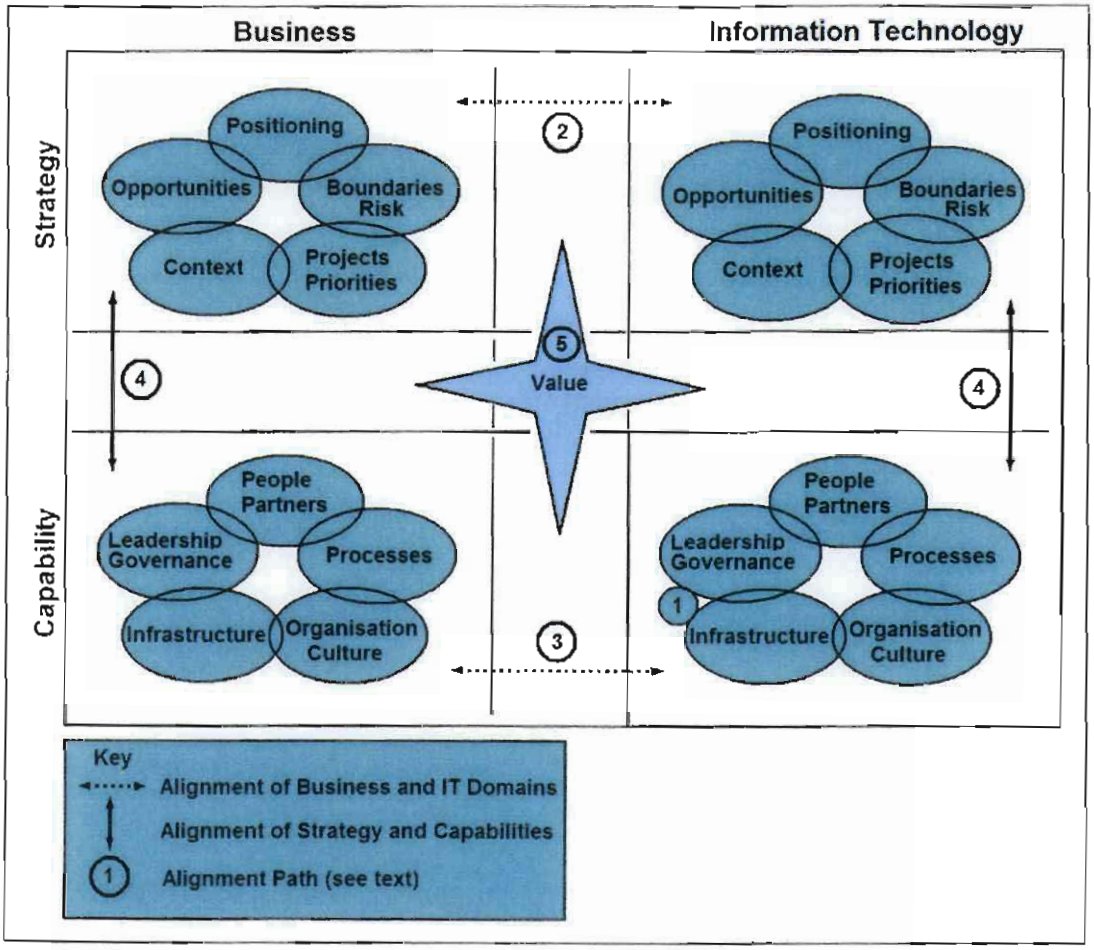
In Michael Porter's classic model of competitive strategy, any business that wants to survive and succeed must develop and implement strategies to effectively counter (1) the rivalry of competitors within its industry (2) the threat of new entrants, (3) the threat of substitutes, (4) the bargaining power of customers, and (5) the bargaining power of suppliers (O'Brien, 2004:42). A business strategy is the match an organisation makes between its internal resources and skills and the opportunities and risks created by its external environment. The process of strategic planning determines where the organisation is going to over the next couple of years, how it is going to get there and how it will follow up on the progress (De Sutter, 2003: 345). For each level of business strategy, there are strategic uses of systems. And for each level of business strategy, there is an appropriate model used for analysis (Laudon & Laudon, 2003:89).

Today, the emphasis is increasingly on exploring, identifying, and occupying new market niches before competitors; understanding the customer value chain better; and learning faster and more deeply than competitors (Laudon & Laudon, 2003:88). Given the growing strategic impact of IT, Henderson and Venkatraman developed the Strategic Alignment Model to assess business and IT alignment across all components of the business model (Applegate *et al.*, 2005:38). **Figure 2.1** on page 20 shows the Strategic Alignment Model. The model illustrates the strategic alignment between business and IT. This model was intended to support the integration of IT into business strategy. The objective of this model was to provide a way to align information technology with business objectives to realize value from IT investments.

Information management personnel need to have a deep understanding of business strategies and requirements, to be able to translate those requirements into business solutions. Information management strategy must define how information, knowledge and applications portfolios can be used to support the business strategy. Business strategy drives information management strategy and through this information management becomes the strategic enabler. Providing information and support for managerial decision making at all levels of management is a complex task. Several major types of information systems are needed to support a variety of managerial end-user responsibilities. These types of management information system are information-reporting systems, decision support systems, and executive information systems (Smit

et al., 2002:178). The business determines and sets the strategy and information management must align to this strategy and not drive it (Laudon & Laudon, 2003:88).

Figure 2.1: Strategic Alignment Model



Source: Adapted from Applegate *et al.* (2005:39).

2.6 Information management and technology

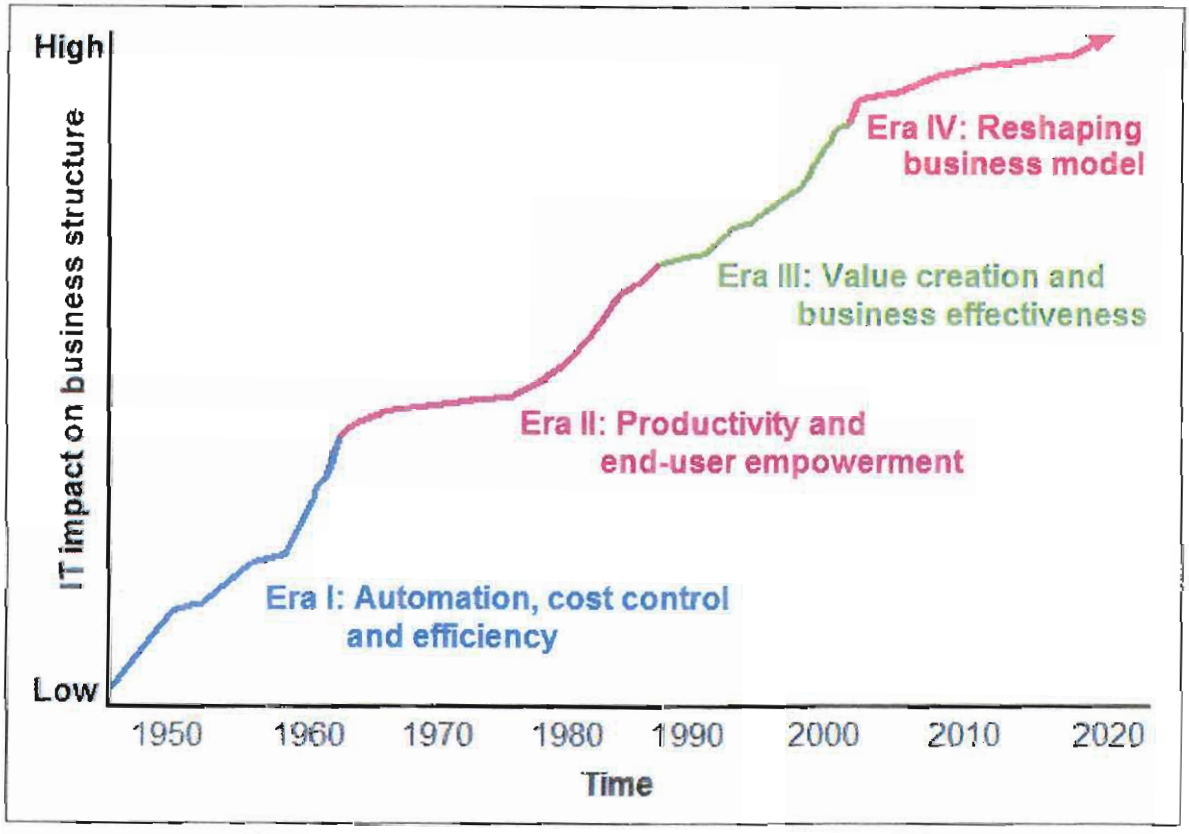
Organisations use technology in general and IT in particular to become more efficient, more effective and to innovate. In times of economic recession, organisations will focus on their internal efficiency and this can indeed lead to staff reductions, whereby IT enables the organisation to do the same with fewer people. In times of economic prosperity however, IT will also enable them to do a better job with the same people. A better job could mean better or cheaper products or services, shorter delivery times, better customer support, and so forth (De Sutter, 2003:347).

Technological change requires changes in who owns and controls the information, who has the right to access and update that information, and who makes decisions about whom, when, and how (Laudon & Laudon, 2003:74). The evolution of IT in terms of technology cycles is illustrated in **Figure 2.2** below. The three central elements of IT that have changed the way in which contemporary organisations function are:

- The Internet and other forms of globally connected networks, which provide the ability to share information on a world-wide basis.
- Electronic commerce, including electronic data interchange (EDI) systems, which enable managers to reshape their business processes to improve response time and efficiency and reduce costs both within and beyond their organisations.
- Mobile computing which enables individuals to have access to IT irrespective of their physical location.

With the advent of personal computers and local area networks, millions of people began to use information technology; and since the emergence of network computing and the Internet, hundreds of millions more have come to use it. IT, like electricity and automobiles before it, is fast approaching its own post-technology phase - a time when the application will be dominant and information technology will gradually sink into the background of our lives and be integrated into society (Wladewsky-Berger, 2004:27).

Figure 2.2: The evolution of IT in terms of technology cycles



Source: Adapted from Pellissier (2001:103).

The IT industry will continue to see Moore's Law at work. The law was formulated by Gordon Moore of Intel in the early 1970s. It predicts that the processing power of a microchip doubles every eighteen months. It will also see the effects of Metcalf's Law, which states that the utility or value of a network is equal to the square of the number of its active nodes. It is attributed to Robert Metcalfe, originator of Ethernet and founder of 3COM. He predicts that as a network grows, the value of being connected to it grows exponentially, while the cost per user remains the same or even reduces (Logan, 2006b). Continuing growth of electronic communications has been described by George Gilder. He predicts that the total bandwidth of communication systems triples every twelve months. This is known as Gilder's Law (Microsoft, 2006).

Information management has become a critical competency in modern high-technology firms. Certain types of information systems have become especially critical to firms' long-term prosperity and survival. Such systems, which are powerful tools for staying ahead of the competition, are called strategic information systems (Laudon & Laudon, 2003:88). It is up to the Chief Information Officer (CIO) to create a vision and set the direction for a company's technology focus. Being able to understand the goals, quantify the issues at hand, and anticipate the needs of the future are the first priorities. The CIO must also be able to transfer these items into a vision and a logical progression that positions the company now and into the future to achieve its goals (Sisco, 2001b:23).

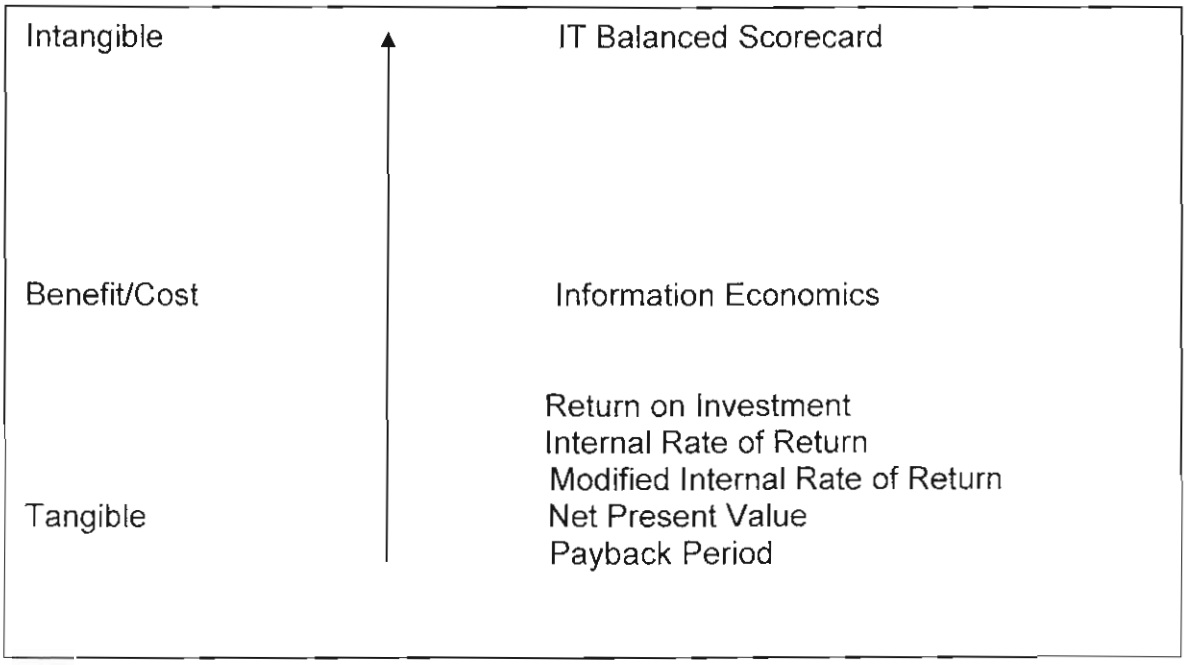
2.7 Return from information management investments

One of the biggest problems facing managers today at all levels is the problem of investing in and using technology efficiently, especially IT. Too often IT costs appear uncontrollable, or if the costs are controllable, the benefits appear uncertain. This is the problem: whereas the average manager can usually grasp the fundamentals of an ordinary business problem and determine what needs to be done to solve the problem efficiently, it is often not the case when it comes to IT related problems. Even a very good manager with reasonable experience of technology can work through the problem several times and still be unable to determine a solution that is efficient when implemented. The problem is not any deficiency in the manager. The problem is that managing IT for maximum efficiency is a very difficult task (Nokes, 2000:1). IT today is

still too often seen purely as a cost to be managed. If spending more money on IT is an answer to business problems, then one would expect there to be hardly any problems left at all in business by now. If more technical knowledge was required to improve a manager's chances of being successful, then all senior managers by now would be technologists, with no lawyers, scientists, accountants, historians, artists, philosophers, or practical people at the top of anything. However, the world is not quite like this. Organisations are run by all sorts of people trained in all kinds of disciplines, and sometimes without any formal training at all. Some of the best organisations are run by technically trained people, and some are not. Sometimes a business opportunity or a business problem is best addressed by investing money in IT, and sometimes it is not. Nokes (2000:1) noted that the problem is to identify those occasions where money should be invested, and to determine how much to invest, and to know when not to invest in IT.

There are different monitoring instruments available for information management related costs, and these are dependent on the features of the costs and benefits. When both costs and benefits can be easily quantified and assigned a monetary value, traditional financial performance measures work well. **Figure 2.3** below shows the different techniques for evaluation of information management related costs and benefits.

Figure 2.3: The most popular IT evaluation techniques



Source: Adapted from Van Grembergen and Amelinckx (2004:154).

- **Return on Investment (ROI):** Return on investment is the ratio of average annual net income of the project divided by the internal investment in the project. The weakness of ROI is that it can ignore the time value of money.
- **Net Present Value (NPV):** Evaluating a capital project requires that the cost of an investment be compared with the net cash inflows that occur many years later. To calculate the NPV, the opportunity cost of capital is used as discount rate. The net present value is the amount of money an investment is worth, taking into account its costs, earnings and other time value of money.
- **Internal Rate of Return (IRR):** The IRR is defined as the rate of return or profit that an investment is expected to earn. It is a variation of the NPV method but calculated using an interest rate that will cause the NPV to equal zero. This is also called the yield of the investment and is often used to define a hurdle rate.
- **Modified Internal Rate of Return (MIRR):** MIRR is a modified IRR. It has a significant advantage over the regular IRR. MIRR assumes that cash flows from all projects are reinvested at the cost of capital, while the regular IRR assumes that the cash flows from each project are reinvested at the project's own IRR.
- **Payback Method:** The payback method is a measure of the time required to pay back the initial investment of a project. The payback period calculations are easy and hence popular but they suffer from the fact that they take no account of the time value of money, the amount of cash flow after the payback period, the disposal value (usually zero with computer systems) and the profitability of the investment (Van Grembergen & Amelinckx, 2004:155).

Most organisations are striving to reduce the cost of doing business to deal with the pressure of a highly competitive, global marketplace. These competing demands generate close scrutiny of proposals for new information management investments. What's more, high profile information management system-failures have raised concerns about why these investments so often fail to live up to expectations. As a result, many information management investment planning processes now require some analysis of the costs and returns expected from that proposed investment.

Traditional evaluation techniques need monetary values for benefits and costs such as ROI, NPV, IRR, MIRR, and the payback method, and they are problematic in measuring IT investments. Multi-criteria methods may solve this problem because they account for tangibles as well as for intangible impacts (Van Grembergen & Amelinckx, 2004:155).

Whether companies use return on investment, return on capital employed (ROCE), economic value added (EVA), or some other value-based metric as the high-level financial objective, they have two basic strategies for driving financial performance: growth and productivity.

2.8 Information management and competitive intelligence

A specialized field of business intelligence known as competitive intelligence focuses solely on the external competitive environment. Information is gathered on the actions of competitors and decisions are made based on this information (Searchtorpedo.com, 2006). Competitive intelligence is an organised collection of information about company competition and data mining from customer records including consumer needs, preferences, and tendencies. Competitive intelligence researchers can gain so much from sustained attention to consumer activity. According to a recent survey (Swartz, 2005:10), a majority of U.S. based companies that claim to use competitive intelligence to guide their decision-making processes either do not use intelligence enough or use it in the wrong way. Competitive intelligence is the creation of knowledge about relevant elements in the competitive environment through a process of focused information collection and analysis. It also involves communicating and applying the intelligence to provide the clients of competitive intelligence (management, companies, industries, suppliers, etc) with early warning of impending threats and business opportunities. The main objective of competitive intelligence is (Muller and Whitehead, 2002:12):

- to continuously scan, track and analyse those elements in the competitive environment that can impact on the industry or business, for example learning about new technologies, products, and processes that can impact on the industry or business;
- to provide early warning (a wake-up call) of impending threats and opportunities to enable timely action;
- to discover and identify new or potential future competitors;
- to disseminate unique, focused, "actionable", intelligence products in a timely fashion to the recipients of intelligence; and

- to ensure that sensitive information is secure against hostile, offensive competitor actions and that company vulnerabilities are not exploitable by competitor threats.

Business leaders are aware of the importance of strategising and communicating the vision and mission of their organisations. Even though the importance of IT and information as strategic competitive media in the modern business world is growing, there is a general lack of IT strategic planning (Pellissier, 2001:125). Competitive intelligence is increasingly being considered an important, if not mandatory, piece of every business' overall strategy and functioning. If developed and used in the right way, competitive intelligence can boost a business' bottom line (McGonagle & Vella, 2004:64). O'Brien (2004: 314) describes the strategic business/IT planning as an evaluation of the potential benefits and risks a company faces when using IT-based strategies and technologies for competitive advantage. Strategic information systems have their role in changing the organisation as well as its products, services, and operating procedures. Using technology for strategic benefit requires careful planning and management (Laudon & Laudon, 2003:99). Planning for competitive advantage is especially important in today's competitive business arena and complex IT environment.

McGonagle and Vella (2004:64) stated that if used well, competitive intelligence results in better performance in three key areas:

- acquisition of new business;
- retention of existing business; and
- improvement of sales-force performance and morale.

Muller and Whitehead (2002:12) suggested a number of practices for successful competitive intelligence:

- top management support, participation and utilisation;
- tailored infrastructure and correct placing;
- using the right people;
- ensuring sustained focus on key intelligence needs;
- availability of resources (finance, people);
- presence of a network of human sources;
- prevalence of a competitive culture;

- proper, in-depth analysis;
- demand-driven production of appropriately developed intelligence products, e.g. competitor profiles, profit and loss analyses, news briefs, intelligence alert;
- ensuring ethical and legal practices; and
- continual sensitising and marketing.

There are a number of best practices for competitive intelligence. Managers need to use them in their own circumstances and determine what works best for them.

2.9 Summary

More and more, organisations are thinking and operating strategically – their very survival depends on information. The information is the lifeblood of an organisation. An essential part of any business strategy is consideration of how information systems strategy supports change. Information management personnel need to have a deep understanding of business strategies and requirements, to be able to translate those requirements into business solutions. The literature study shows that there is no universal definition of Information Management (IM). Experts agree that information management has become a competitive necessity for all types of companies. The organisations that will succeed in the global information environment are those that can identify the value of information. When information is used effectively it becomes one of key, if not the key, organisational resources of the information age. Organisations have always struggled to leverage information in the most efficient way possible, and technology certainly aids in that process. New economy drivers all depend in some way on technology or are connected to it. Organisations use technology in general and IT in particular to become more efficient, more effective and to innovate. One of the biggest problems facing managers today at all levels is the problem of investing in and using technology efficiently, especially IT. Traditional evaluation techniques such as ROI, NPV, IRR, and the payback method, are problematic in measuring IT investments. Business Intelligence (BI) enables organisations to make well informed business decisions and can thus be the source of competitive advantages. This is especially true when companies are able to extrapolate information from indicators in the external environment and make accurate forecasts about future trends or economic conditions. BI becomes a top initiative and investment priority for Chief Information Officers (CIOs) and Chief Executive Officers (CEOs).

CHAPTER 3: INFORMATION MANAGEMENT PRINCIPLES AND BEST PRACTICES

"Information technology has always been a wildcard in business, a source of opportunity and uncertainty, of advantage and risk".

- Lynda Applegate

3.1 Introduction

Within this section, the numbers of information management components are identified as a foundation for the more in-depth discussion on information management principles and best practices in broad base industries. De Sutter (2003:391) described the concept 'best practice' as a policy, procedure, process, technique, tool or methodology that, through experience and research, has proven to reliably lead to a desired result. For the discussion of information management principles and best practices it is imperative to understand:

- What information management consists of?
- What regulations and standards are important?
- What are the levels at which information management must be considered and how can it be executed at these different levels?
- Can information management be utilised for specific projects or work groups without impacting upon the entire organisation?
- What is the scope of information management in relation to the types of information that it should embrace?
- What are the acceptable practices relating to handling information?
- Does the company have the necessary functions, processes, and procedures defined to manage information environment?

3.2 Regulatory requirements for information management

From the time when the United States of America (USA) companies Enron, Worldcom and Xerox pushed the issue of corporate accountability into the spotlight, there's been a number of Acts, recommendations and guidelines that spell out what good corporate governance is about and which companies are expected to comply with if they wish to

be seen as good corporate citizens. As a result, compliance across many disciplines is rapidly becoming standard operating procedure without which companies would be seen as bad business risks (Madyibi, 2006:2).

The acts and guidelines that South African companies are most likely to come up against are the following:

ECT Act

The Electronic Communications and Transactions Act, 2002 (ECT Act) is a law in South Africa and companies need to make sure they comply with the provisions relating to the regulation of electronic communications and transactions (Madyibi, 2006:2). This act specifies that e-mail messages may be admitted in a court of law as original documents, as long as they meet certain rigorous criteria, such as whether it has remained complete and unaltered since it was generated; and was accessible by the person to whom it was sent. Vendors must also provide a secure payment platform, as well as the facility to let customers cancel a transaction within a reasonable "cooling-off" period. Spam is also covered by the act, which protects consumers from unsolicited e-mail and gives them the option to be removed from any mailing list. The ECT Act is one of many sources of law which impact on electronic communications and transactions and must not be read in isolation of relevant statutory and common law. It applies to any form of communication by e-mail, the Internet, SMS and so forth, except for possibly voice communications between 2 people (Michalson & Hughes, 2005:1).

Interception Act

The Regulation of Interception of Communications and Provision of Communication-related Information Act, 2002 (RICA) is currently a law in South Africa but, to date, has not been put into action (Madyibi, 2006:3). The Act protects users' privacy by detailing how companies and individuals may not intercept communications, except under specific conditions. The Act also places the onus on Internet service providers (ISPs) and cellular network providers to make it possible to intercept e-mails and cellphone calls. They will have to install the necessary technology and set up data lines to

provincial interception centres at their own cost (Vecchiatto, 2005). On a simplistic level, companies may intercept employees' e-mail-messages if it is company policy to do so and the employee has signed an agreement to that effect. Although there are a number of IT-related considerations pertaining to this Act, more effort probably needs to go into policy generation and enforcement. In terms of the state's right to intercept e-mails, it still has to be determined what ISPs need to do to intercept and retain communications, and who will fund the necessary equipment.

The Convergence Bill

This has been signed into law in April 2006, and is now known as the Electronic Communications Act (EC Act). Companies that will need to comply in terms of this act are network carriers: telecommunications providers, Internet service providers, wireless network providers and others of that ilk. The impact for other businesses lies in the fact that it has the potential to speed liberalisation and could bring down telecommunications prices in the future. The new act outlines a simple licensing model, makes interconnectivity between networks mandatory and will allow local authorities to start introducing their own networks. Although this is officially a law, a number of details have still to be finalised, and it is not yet in effect since it hasn't been proclaimed (Madyibi, 2006:3).

King II

The King Report on Corporate Governance, 2002 (King II) was published by the Institute of Directors and comprehensively covers what companies need to consider in order to claim good governance. The King II report is a set of guidelines and recommendations for large companies and is not a law in itself (Madyibi, 2006:3). However the JSE securities exchange now requires that listed companies comply with the codes in King II as part of its own codes. The King II report treats compliance as a matter between boards and stakeholders, and relies on disclosure as a mechanism that will enforce compliance. The codes of corporate governance as outlined in the King II report are applicable to JSE listed companies; banks, financial and insurance companies; and some public sector enterprises and agencies.

Sarbanes-Oxley

The Sarbanes-Oxley Act, 2002 is a law - but it refers only to companies listed on United States of America (USA) securities exchanges, or those that are required to file reports with the Securities Exchange Commission (SEC) in the USA. South African companies are largely exempted from following Sarbanes-Oxley, except where they are subsidiaries of companies listed in the USA, or are themselves listed on a USA securities exchange (Madyibi, 2006:4). Sarbanes-Oxley came about following a series of high-level business scandals and earnings restatements that resulted in significant losses for shareholders, including pensioners and bankruptcies. The Sarbanes-Oxley Act imposes good corporate governance for listed entities, ensuring that proper reporting takes place and imposing of new penalties for fraudulent behaviour. Significantly, Sarbanes-Oxley places the responsibility for good corporate governance and accurate reporting directly on to the CEO and CFO. Section 404 of Sarbanes-Oxley is also known as the internal control provision of the act. Under Section 404 of Sarbanes-Oxley, publicly traded companies must have policies and controls in place to secure, document, and process material information dealing with their financial results. One of the key requirements from a Sarbanes Oxley perspective is that financial information has integrity. The integrity of information can be impacted by a number of factors, including input, processing and output errors; however, information security plays a very important role in ensuring the integrity of the information throughout the various stages from input, processing, storage and output. In addition, information security provides the availability aspect to financial information which is also required by Sarbanes Oxley (Teare, 2006).

Basel II

The International Convergence of Capital Management and Capital Standards (the second Basel Accord, or Basel II) contains recommendations from bank supervisors and central bankers from the thirteen European countries making up the Basel Committee on Banking Supervision. The accord seeks to promote greater consistency in the way banks and banking regulators approach risk management across borders. To promote more stability in the international financial system, Basel II focuses on three

pillars: minimum capital requirements; supervisory review; and market discipline (Madyibi, 2006:4).

COBIT

The Control Objectives for Information and Related Technology 4.0 (COBIT) is a set of guidelines published by the IT Governance Institute. It is not a law but represent recommendations of best practices for information management departments to implement good governance (Madyibi, 2006:4). COBIT is an IT governance framework and a supporting toolset that allows managers to bridge the gap between control requirements, technical issues and business risk. It emphasises regulatory compliance and helps companies increase the value of their IT systems to the business while enabling alignment and simplifying implementation. In practice, COBIT is a process model for IT resources that lets companies to develop suitable controls for each of the 34 different IT processes. COBIT provides common language for business and information management. With COBIT, information management departments can define a strategic plan that matches the business strategy. COBIT covers four domains: plan and organise; acquire and implement; deliver and support; and monitor and evaluate (IT Governance Institute, 2005:10).

ITIL

The Information Technology Infrastructure Library (ITIL) is a customisable framework of best practices that promote quality computing services in the IT sector. ITIL addresses the organisational structure and skills requirements for an IT department through a set of management procedures which are supplier-independent and apply to all aspects of IT infrastructure. Once an IT department has successfully implemented ITIL recommendations, it could be eligible for ISO 20000 certification. ISO 20000 is the international standard for IT Service management (ISO 20000 Central, 2006). At first glance, they may appear to address similar issues, but ITIL and COBIT are not mutually-exclusive, since ITIL refers to the IT infrastructure and COBIT with aligning IT systems across the board with business strategy (Madyibi, 2006:5).

There have been a plethora of published articles about regulatory acts but very little of the content described what companies could do in practice to comply with regulations. The nature of information management's role in compliance varies widely among companies, but it's clear that growing regulatory requirements are giving IM specialists greater responsibility and bringing them into contact with different corporate departments. The information management department has always had to shoulder some of the responsibility for compliance with current laws regarding enterprise data. Vernon (2006:27) has indicated that most information management executives consider security and privacy, document retention, and financial regulation as the top three compliance activities. Industry changes that impact a company that deals with software regulatory changes needs to be constantly reviewed by an information management manager. An early warning system was suggested by Sisco (2001a:70) to be put in place that helps managers know about upcoming changes relevant to his responsible area as early as possible. Although this idea looks promising no practical guidance was given. Another practice that organisations can use (Madyibi, 2006:2) is the appointment of a full-time compliance officer just to keep track of what's required and advise the organisation on how to do it. The question is that dominant skill would be needed for this position - the intersection of information management skill and law regulations skill. The information management specialist is not expected to be knowledgeable in law regulations and vice versa. The important thing is, that companies in the end, link spending on compliance to the investment in wider business goals (Vernon, 2006:27). One should not forget to mention implementation of COBIT framework that will enable organisations to implement an IT governance structure throughout the organisation. Some experts in the field have suggested that ITIL compliance would go a long way towards helping organisations with the phases of COBIT that focus on acquiring, implementing, delivering and supporting IT services.

Today, most companies face increasing security threats from hackers and data thieves. The legal and regulatory consequences of a security breach are more serious than ever before. For many companies, meeting initial compliance requirements is merely the first step in an ongoing process of addressing new regulatory requirements and ensuring compliance over time. As the number of regulatory requirements increases, companies need to take a proactive approach to securing, storing and accessing company information to ensure best practice and regulatory compliance.

3.3 Management of service outsourcing

Historically, outsourcing has been seen as a way to reduce costs by getting others in cheaper locations, or with greater economies of scale, to own the processes that are not core to the business. The worldwide market for customer service outsourcing is set to grow from $84-billion in 2004 to $12.2-billion in 2007, but the offshore component will remain small (Gibson, 2005:16). Today, companies are outsourcing all or significant parts of their management of IT. The reasons for outsourcing include concern for cost and quality, lagging IT performance, supplier pressure, access to special technical and application skills, and other financial factors. The inside look to the process of outsourcing shows a simple rule that managers and consultants use in making outsourcing decisions. The rule is that firms should outsource components or services if it is not their core competence, or if somebody else can do it at a lower cost. Some companies spin off their information systems function into IS subsidiaries that offer IS services to external organisations as well as to their parent company. Other companies created or spun off their e-commerce and Internet-related business units or IT groups into separate companies or business units. Other corporations outsource, that is, turn over all or parts of their IS' operations to outside contractors known as system integrators. In addition, some companies are outsourcing software procurement and support to application service providers (ASPs), who provide and support business application and other software via the Internet and intranets to all of a company's employee workstations (O'Brien, 2004: 430). From a relatively unusual entrepreneurial activity in the past, IT outsourcing has become a fact of life across the global corporate landscape. Like marriages, however, outsourcing arrangements are much easier to enter into than to sustain or dissolve (Applegate *et al.*, 2005:437). Tardugno (2006: 209) argued that the decision to outsource is not purely an economic consideration. The ability to react to changes in the business with timely delivery of quality services plays a big role.

According to Gartner (Gibson, 2005:16), companies that successfully outsource can achieve cost savings of 25% to 30%. Several financial issues make outsourcing appealing. One is the opportunity to liquidate the firm's intangible IT asset and thus strengthen the balance sheet and avoid a future stream of sporadic capital investments. Applegate *et al.* (2005:443) indicated that outsourcing can turn a largely fixed-cost

business into one with variable costs. This change is particularly important for firms whose activities vary widely in volume from year to year or which face significant downsizing.

There are a number of disadvantages to the process of outsourcing a company's IT. Many employees feel threatened when outsourcing occur. If a company goes overboard on outsourcing, it can hollow out its knowledge base and capabilities, putting itself at the mercy of outside suppliers. Much information is lost because no attempt is made to harvest the information that many employees have before they are allowed to leave. In such cases, a company loses touch with the very activities and expertise that over the long run determine its success. If the requirements, expectations, and metrics are not defined sufficiently, the outsourcing process will most probably fail. Companies are encountering problems because they don't approach this strategically. They usually lack information to make meaningful cost benefit analyses, and often focus on inappropriate or immeasurable service levels and cost metrics (Gibson, 2005:16).

To avoid loss of control, companies should work closely with key suppliers, endeavouring to make sure that suppliers' activities are closely integrated with their own requirements and expectations. Many companies refuse to source key components from a single supplier, opting to use two or three suppliers as a way to avoid becoming overly dependent on any one supplier and giving any one supplier too much bargaining power. Moreover, they regularly evaluate their suppliers, looking not only at the supplier's overall performance but also at whether they should switch to another supplier or even bring the activity back in-house. Outsourcing strategy-critical activities must be done judiciously and with safeguards against losing control over the performance of key value chain activities and becoming overly dependent on outsiders. Gartner puts forward the following recommendations for organisations when defining their customer service outsourcing strategy (Gibson, 2005:16):

- business should only consider outsourcing non-core processes and those that are not key organisational competencies;
- map the entire customer process from the customer perspective;
- link specific outsourcing actions to the organisation's strategy;
- businesses should not be lured by the apparent cost appeal of placing end-to-end customer services processes in the cheapest offshore locations. Start by outsourcing onshore;

- conducting appropriate pilot testing before the organisation is locked into long-term outsourcing contracts;
- dedicate sufficient management resources to the intersection between outsourced and retained processes; and
- develop contracts that require innovation in service delivery to reduce the cost of ongoing operations.

3.4 Selection of service providers

Organisations basically have two options for sourcing information management services: they can either provide the information management service themselves through their own internal IT division insourcing or use an external IT service provider (Beulen, 2004:311). The most critical step in assembling an IT service chain is the selection of service providers. Providers differ greatly in the service increments they offer, how they charge for services, the guarantees they can make, and the guarantees they are willing to make. No expertise in relationship management can overcome choosing an unreliable service provider. Companies therefore must take tremendous care in selecting business partners that perform vital service chain functions (Applegate *et al.*, 2005:343).

At its best, a service provider is a partner in the client's business, providing the contracted services today and looking toward improvements to meet future needs. Beulen (2004:314) has emphasised the importance of selecting a service provider that is comparable to the outsourcing organisation in relation to its relative size. The argument was that in the case of the service provider being relatively larger than the outsourcing organisation the attention may not be as appropriate as necessary over the contract period. In the case that the service provider is relatively smaller than the outsourcing organisation there might be a chance that the outsourcing company cannot benefit from economies of scale. Furthermore, the service provider may find difficulties in implementing innovations and flexibility. The most common process for selecting service providers identified by Applegate *et al.* (2005:344), involves writing a "request for proposal" (RFP) and submitting it to a set of apparently qualified service providers. An RFP asks prospective providers for information that is relevant to their service capabilities across a spectrum that includes financial, technical, and operational information. Typically request information are related to information about a service

provider's priorities, service provider's financial strength, proposed plan for meeting service requirements, mitigation of critical risks, and pricing. The problem with this approach is that almost every company has its own rules around RFP. A final criterion for selection varies from company to company.

Not all IT outsourcing partnerships are a success. There are three key factors that cause IT outsourcing partnerships to be unsuccessful; lack of maturity of the outsourcing organisation, contracts that are inflexible and an insufficient degree of integration of the IT division taken over into the organisation of the IT supplier (Beulen, 2004:332). Wilson (2005:58) noted that most IT professionals are very often frustrated with the *service providers* of their field. Cohen (2006) argued that companies too often lack the requisite organisational action plan and launch into outsourcing prematurely, without performing the complete and diligent work required before engaging with service providers. Many major outsourcing contracts are structured to expand over long periods of time. However, these agreements exist in a world of fast-moving technical and business change. Eight to ten years is the normal length of a contract in an environment in which computer chip performance is improving by 20 to 30 percent per year. The standard contract length addresses the customer's difficulties in switching service providers as well as economic issues. But a deal that made sense at the beginning of the contract may not make economic sense three years later and may require adjustments to function effectively (Applegate *et al.*, 2005:438). Companies need to do frequent evaluation and revision of their outsourcing contracts. They need to establish whether outsourcing functions are right for the organisation, which type of service provider they should choose, what performance expectations are appropriate and how the company will know if their resources and expertise are appropriate for the organisation's needs.

Ensuring that service providers are meeting performance expectations, Renaud (2005:34) proposed that companies monitor and measure service providers' performance, and complain to the service provider each time they perform below the company's expectations. Beulen (2004:310) emphasized the importance of IT outsourcing partnerships. Alignment of mutually set goals of the IT outsourcing relationship is a prerequisite to achieve governance. For an alliance to be successful and last for the long term, both firms must believe they are winners because they benefit from the synergistic potential of the relationship and the opportunity to specialize

(Applegate *et al.*, 2005:440). The main criteria for judging the performance of service providers when it comes to information management could be summarised as follows:

- on-time delivery of information;
- accurate, reliable and credible information;
- complete information;
- properly formatted information;
- correct billing information; and
- safeguarding the information.

Since many outsourced services involve entrusting data to service providers, contractual relationships need to contain provisions about a customer firm's rights to control its own data (Applegate *et al.*, 2005:344). The key in selecting a service provider is to reach an agreement that drives a provider to deliver good service, while making it painful to deliver poor service (Wilson, 2005:58).

3.5 Information management governance

Today, more than ever, organisations need an effective corporate governance program to address all of their information, whether it is an information message that resides on a mobile device or a piece of paper, stuffed away in a file cabinet. Myler (2005:16) noted that companies usually address information management governance in one paragraph. He contends that the solution lies in expanding the standard paragraph and providing a link to a more detailed corporate governance program for information management. This program should address all the components of managing information including the actual information, no matter where it resides, and also all the tools used to create and keep information. Corporate governance is the body of rules, agreements and standards that define the basis for interaction between different people, departments, roles and functions within the enterprise. Governance principles determine the way decisions get resolved at all levels, from senior management to technicians, within traditional hierarchies and across business boundaries. Information management governance should be an integral part of corporate governance. Organisations need an effective corporate governance program to address all of their information.

A number of authors (Guldentops, 2004; Peterson, 2004; O'Brien, 2004: Weill & Ross, 2004) contributed towards information management governance. The common denominator for all of these authors is that they addressed IT governance only. To the same account one can add *Control Objectives for Information and related Technology* (COBIT) which was issued by the IT Governance Institute (2005). COBIT presents an international and generally accepted IT control framework enabling organisations to implement an IT governance structure throughout the enterprise.

Good information governance ensures the quality, accuracy and authenticity of information resources and compliance with legislation, which ranges from copyright, data protection to libel on the Internet. The information professional needs to understand their role and liabilities in relation to legislation and how to manage resources to reduce the risks (Freeman, 2004:17). In their research Weill and Ross (2004) concluded that good IT governance pays off. Among the companies they studied, the ones pursuing a specific strategy with above-average IT governance performance had superior profits as measured by a three-year industry-adjusted return on assets (ROA). The differences varied by strategy of the firm, but the above-average governance-performing firms had ROAs more than 20 percent higher than the firms with poorer governance pursuing the same strategy. Governance was, of course not the only factor, but good governance often comes with effective management practices in all areas. Vreeland – Capgemini (2005) argued that most organisations have spent millions on system and network discipline for larger hardware, latest database management environments, and larger networks. Yet, there is no one responsible for managing the information asset environment for the organisation! This means there is duplication of data, different systems managing the same data resulting in increases of reporting differences. The view clearly represents the common failures of information management governance. Hill (2005:96) has identified a number of governance implementation failure points including inadequate participation by business management and a lack of clarity. This view only addressed information management governance implementation failures related to IT.

There are a number of symptoms of ineffective governance:

- Senior management senses low value from information management investments;
- Information management is often a barrier to implementing new strategy;

- The mechanisms to make information management decisions are slow or contradictory;
- Senior management cannot explain information management governance;
- Information management projects often run late and over budget;
- Information management governance changes frequently;

When benchmarking for best and worst performers Weill and Ross (2004) suggested a couple of indicators to be used:

- Percentage of managers who can accurately describe governance.
- Percentage of projects with renegade exceptions on at least one component.
- Percentage of new systems with agreed-upon exceptions on at least one component.
- Average number of changes in governance per year.

To help management decide where to begin and to ensure that the implementation process delivers results, the following steps are suggested by Poole (2006):

- Set up an organisational framework with clear responsibilities/objectives/ participation from all interested parties who are involved in taking implementation forward.
- Align IT strategy with business goals.
- Understand and define the risks.
- Analyse current capability and identify gaps.
- Develop improvement strategies, and to decide which of them are the highest priority projects that will help to improve the management and governance of these significant areas.
- Establish a scorecard mechanism for measuring current performance and monitoring new improvements.

The number of acts and guidelines like the ECT Act, Interception Act, The Convergence Bill, King II, Sarbanes-Oxley, Basel II, COBIT, and ITIL will help companies to establish the critical process of defining clear information management priorities regarding information management governance and improve their information management practices.

3.6 IT standardisation

Standards are essential elements of IT-hardware, software, and networks. Standard interfaces, for example, permit disparate devices and applications to communicate and work together. Standards also underpin computer security and information privacy, and they are critical to realizing many widespread benefits that advances in electronic and mobile commerce are anticipated to deliver (NIST, 2006). This view is supported by Weill and Ross (2004) stating that effectively implemented technology standardisation helps the enterprise build an enabling IT capability. Most of the IT standards are published by the International Organisation for Standardisation (ISO, 2001). IFLANET (2006) provides information about organisations that contribute towards IT standards. A few of them are listed below:

- American National Standards Institute (ANSI).
- Association for Information and Image Management International (AIIM).
- Association for Computing Machinery (ACM). SIGCOMM.
- IEEE Computer Society.
- Information Infrastructure Standards Panel (IISP).
- International Organisation for Standardisation (ISO).
- National Committee for Information Technology Standards (NCITS).
- World Wide Web Consortium (W3).

On a Saturday in mid-February 2004, a month after the Bank One deal was announced, Jamie Dimon, the new CEO of J.P. Morgan brought together the top IT people. He dazzled them with his grasp of protocols and software costs, and then told the managers to choose a single platform in any area where multiple systems were in place. "If you don't do it in six weeks," he warned, "I'll make all the choices myself." The IT managers met the deadline. Now, for example, J.P. Morgan has just one system for credit cards. The new platform, called TSYS, has helped bring down the bank's annual cost of processing statements to $52 per customer from $80. That makes J.P. Morgan one of the most efficient operators in the industry (Tully, 2006:36). This example clearly indicates that companies need to standardise on currently used, best practice technologies, aligned with enterprise requirements.

To achieve alignment of best practice to business requirements, it is recommended that COBIT be used at the highest level, providing an overall control framework based on an

IT process model that should generically suit every enterprise. COBIT stands for 'Control Objectives for Information and related Technology'. It is basically an 'open' standard for IT security and control practices. COBIT has been developed and is maintained by an independent, non-profit research institute - IT Governance Institute. It was first produced in the early 1990's. There have been a number of revisions since then as it has become more widely embraced and used, internationally (IT Governance Institute, 2005:27).

For the earlier COBIT development and updating activities, a broad base of more than 40 international detailed IT standards, frameworks, guidelines and best practices was used to ensure the completeness of COBIT in addressing all areas of IT governance and control.

Because COBIT is focused on *what* is required to achieve adequate management and control of IT, it is positioned at a high level. The more detailed IT standards and best practices are at a lower level of detail describing *how* to manage and control specific aspects of IT. COBIT acts as an integrator of these different guidance materials, summarising key objectives under one umbrella framework that also links to governance and business requirements. IT Governance Institute (2005:181) identified six of the major global IT-related standards, frameworks and practices. These are detailed below:

- Committee of Sponsoring Organisations of the Treadway Commission (COSO):
    - *Internal Control—Integrated Framework, 1994*
    - *Enterprise Risk Management—Integrated Framework, 2004*
- Office of Government Commerce (OGC):
    - *Information Technology Infrastructure Library (ITIL), 1999-2004*
- International Organisation for Standardisation:
    - *ISO/IEC 17799:2005, Code of Practice for Information Security Management*
- Software Engineering Institute (SEI):
    - *SEI Capability Maturity Model (CMM), 1993*
    - *SEI Capability Maturity Model Integration (CMMI), 2000*
- Project Management Institute (PMI):
    - *Project Management Body of Knowledge (PMBOK), 2000*

- Information Security Forum (ISF):
    - *The Standard of Good Practice for Information Security, 2003*

COBIT has been aligned with other, more detailed, IT standards and best practices. It is continuously kept up to date and harmonised with other standards.

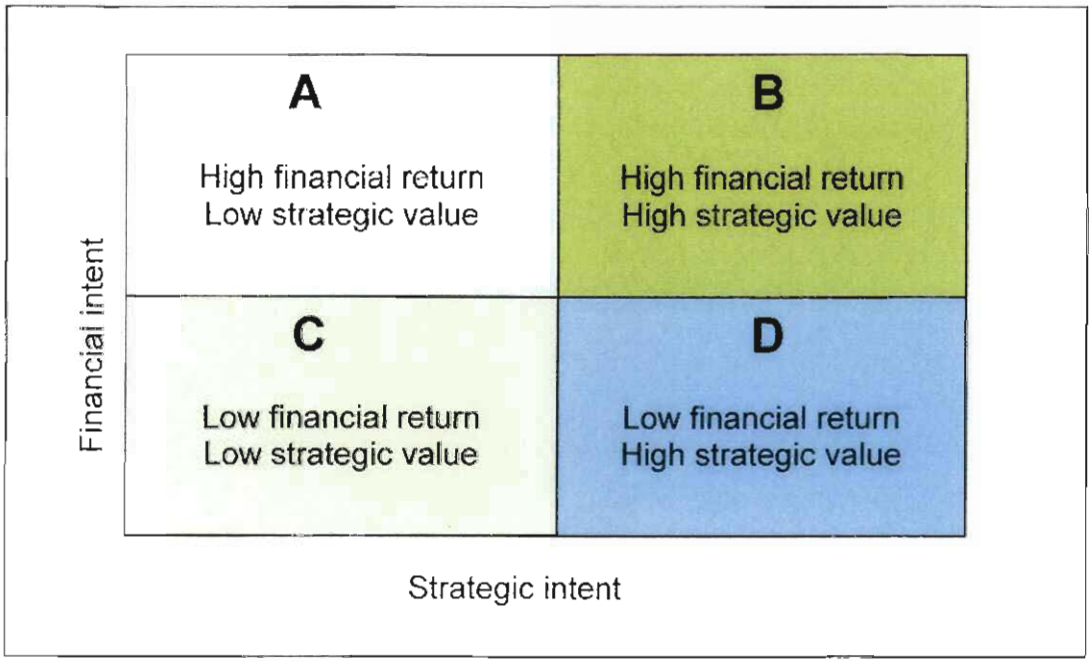
3.7 Project management

Projects have always been a part of life – ever since the first groups of humans worked together to gather, plant and hunt. Over the years, the concept of project management - planning and directing the activities executed by a group of people with fixed objectives over a limited period of time - has been refined and formalized into a profession (De Sutter, 2003:222). Companies implement projects, or spend capital, for improved financial results and/or for strategic position in relation to competitors in order to improve financial results in the future. The ultimate project of course is the one which results in high financial returns as well as the strategic positioning of the company (Greeff & Choshal, 2004:308). Companies performing project management services are always searching for ways to become better, faster, more efficient, and more competitive. With information management an emphasis needs to be placed on improving the access to, and quality of, project information (Back & Moreau, 2001:10). Greeff and Choshal (2004:308) classified a generic project portfolio according to a project's financial and strategic intent. They divided projects in four main categories. **Figure 3.1** on page 44 is a representation of this classification.

- A - those projects that will bring about significant financial returns by improving processes or by reducing costs.
- B - those projects that are done to stay in business and include equipment replacement or rebuilding.
- C - those projects that are done to keep business ahead of the competition.
- D - those projects that are the preferred projects, as they support the strategic intent of the company and have high rates of financial returns.

Most information management projects are classified as B or C type projects due to the impact of rapidly evolving nature of technology, particularly IT on information management. Companies see IT as a necessary evil whereas others identify IT as a strategic advantage over their competition.

Figure 3.1: The generic project portfolio



Source: Adapted from Greeff and Choshal (2004:309).

Information management and IT may be difficult to consider separately since the tools that are often used to enable information management have been technologies. Also in the world of IT there are many projects, mostly situated in the area of software development. Unfortunately, it is also a fact that many IT projects fail: they are delivered too late, they are too expensive, or do not live up to the expectations of users (De Sutter, 2003:223). Applegate *et al.* (2005:454) stated that requirements for information management projects are volatile, difficult to determine, and they tend to evolve throughout the project. In his comparison of IT projects with other types of projects like a building project for example, De Sutter (2003:223) identified a number of reasons why IT projects fail. Much of the work only becomes visible at the end of the project when it is too late to correct mistakes. Allocation of some extra IT resources to speed up a project is difficult as the resources are limited and the project manager has to do with whatever is available. Furthermore, when new resources are added, they are not productive from the start. It is almost impossible to run an IT project separate from the rest of the organisation. With IT there is an influence on different parts of the organisation and IT has to remain available all the time. Another problem occurs because a lot of the work of an IT project has to be done by non IT people: management and staff of the end user community. Often, these people have to carry on with their normal work and have other priorities while the development team is constantly on their back with questions, tests etc. In conclusion, the information

management projects are different from projects in other areas; this is why a different approach in managing these projects has to be adopted.

There are a number of principles and practices related to project management. Laudon and Laudon (2003:443) suggested that organisations should establish a program office to manage subprojects, coordinate the entire project effort with other ongoing projects, and coordinate the project with ongoing changes in the firm's business strategy. Back and Moreau (2001:18) suggested that project management information needs to be integrated, preserved, and leveraged throughout the entire project life cycle. PRINCE2 (2006) emphasized a structured project management method. Sisco (2001a:68) emphasized the importance of planning and anticipating in project management. Applegate *et al.* (2005:454) argued that a company can potentially reduce the risk associated with unfamiliar technologies by hiring consultants with expertise in those technologies. De Sutter (2003) proposed a number of best practices that can be used for information management projects:

- Think big, develop small
- Rank project elements up front
- Avoid big bangs
- Expect the unexpected
- Limit the size of the project teams (small teams have less communication problems
- Not all developers are created equal
- Fit the methodology to the project, not the other way around
- Design twice, do work once
- Use the right programming language for the job
- Do not re-invent the wheel
- Separate concerns (technical people should make technical choices and functional people should make functional choices)
- Involve the users
- Do not be afraid of risks
- Take care of the installation process

3.8 Change management

The requirement for change management has increased over the preceding decade and this requirement will go on increasing at an accelerated rate over the coming one. The reasons for this are complex and multifarious; mostly depend on the increasing external influences that affect organisations. Influence that legislation will have on information management is one of them. Conceptions of planned change have tended to focus on how change can be implemented in organisations. Called "theories of changing", these frameworks describe the activities that must take place to initiate and carry out successful organisational change. Cummings and Worley (2005:22) describe and compare three theories of changing: Lewins Change Model, the Action Research Model, and the Positive Model. One of the early fundamental models of planned change was provided by Kurt Lewin. He conceived change as modification of those forces keeping a system's behaviour stable. The model consists of only three steps: unfreezing, movement and refreezing. Historically this is an important model, but to my mind it is an outdated model. Lewin's approach to change assumed that organisations operate in a stable state. The new models need to be investigated to accommodate fast changes of the information management as a discipline. The classic action research model focuses on planned change as a cyclical process in which initial research about the organisation provides information to guide subsequent action. It places heavy emphasis on data gathering and diagnosis prior to action planning and implementation, as well as careful evaluation of results after action is taken. The positive model represents a significant departure from Lewin's model and the action research process. Those models are primarily deficit based; they focus on the organisation's problems and how they can be solved so it functions better. The positive model focuses on what the organisation is doing right. It helps members understand their organisation when it is working at its best and builds off of those capabilities to achieve even better results. The three models of planned change suggest a general framework for planned change. The model has four basic activities that practitioners and organisation members jointly carry out in organisation development. The typical sequence of events is from entering and contracting, to diagnosing, to planning and implementing change, and to evaluating and institutionalizing change.

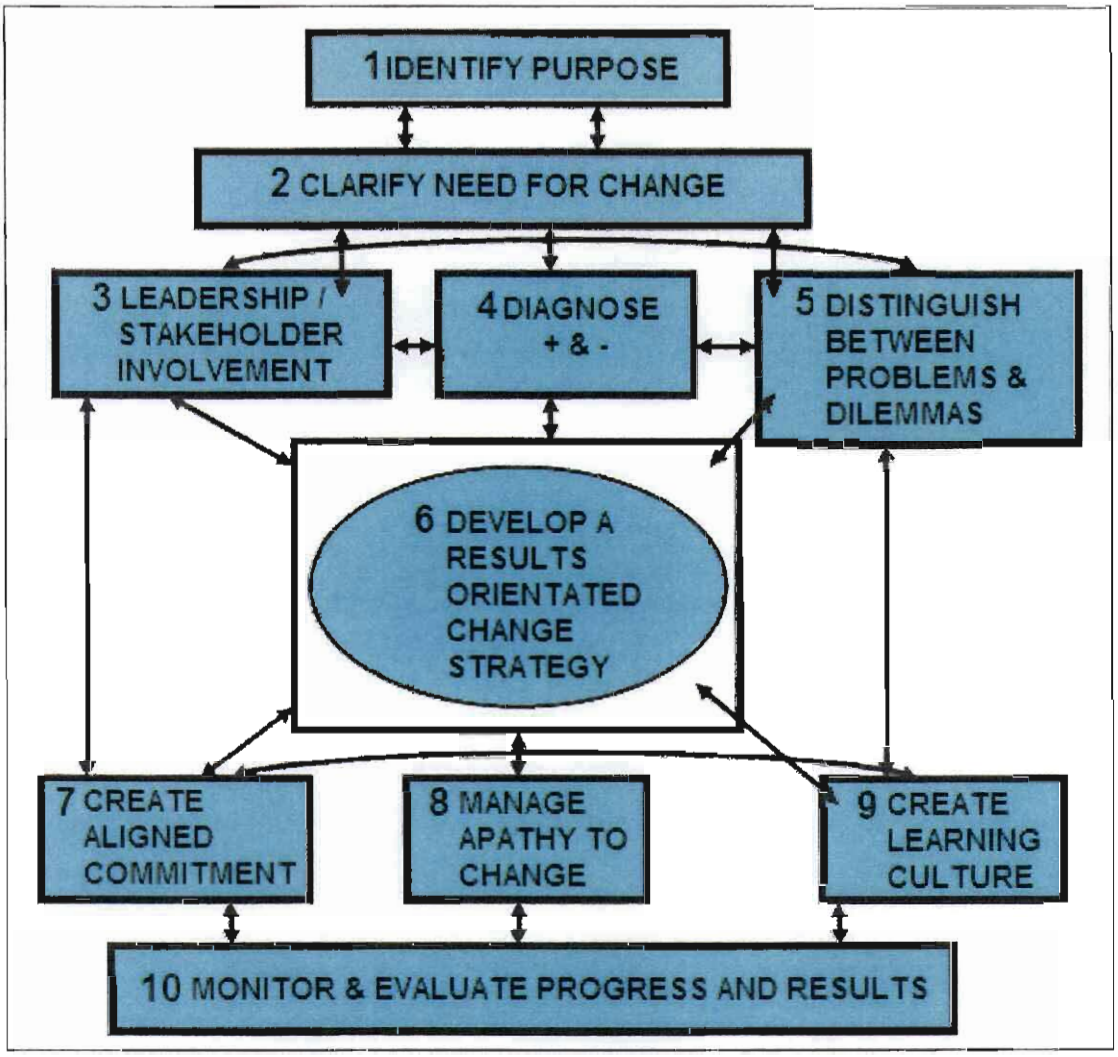
Change is an inevitable part of life yet it frequently causes problems. By using a change management proactively rather than retrospectively, some of the dimensions and

consequences of change can be considered and acted on. Coetsee (2006:48) suggested the following ten principles when addressing the change:

- **Establish what the results of the change process should be**: This involves creating a vision and involving all stakeholders so that they understand the end deliverable/s that would result from the change.
- **Clarify the need for change**: This involves educating the stakeholders about how they would benefit from the change and why the change is necessary.
- **Involve and obtain the commitment of all stakeholders in the planning and execution of the change process:** By involving all stakeholders they would feel a sense of belonging and it would result in their commitment and alignment with the objectives of the change.
- **Diagnose present functioning:** This helps people understand the underlying causes why the change is required and so that they do not feel threatened as a result.
- **Develop a results-orientated rather than an activities-orientated strategy for change.**
- **Assure that enabling structures are all aligned:** This ensures that the change is seen as meaningful.
- **Pay special attention to the organisational culture and climate:** All projects and change cannot be carried out at the same pace. Once the culture and climate is determined a plan can be made to fit in with the current conditions.
- **Create a change adept learning organisation.**
- **Diagnose and manage resistance to change.**
- **Build in reliable feedback mechanisms to monitor, manage and eventually evaluate the change process:** By measuring the process, the impact on the organisation can be determined and managed accordingly.

Although these principles and practices are specified for general use, most of them can be applied when doing a change intervention related to information management. Ten principles of change management are illustrated in **Figure 3.2** on page 48.

Figure 3.2: Ten principles of change management



Source: Adapted from Coetsee (2006:48-51).

Coetsee (2006:244) also suggests the use of a very interesting and also effective approach to problem solving was developed by Gerald Nadler of the University of Southern California and Shozo Hibino of the Chukyo University in Japan. The method is known as the "Breakthrough-Thinking" method. The method has seven proven principles of successful solution findings:

- **The uniqueness principle**: Each problem is unique and an approach must be applied which focuses on the unique or specific needs and circumstances of which the problem is part.
- **The purposes principle:** Focussing on the purposes of problem-solving helps stripping away non-essential aspects and avoids working on the wrong problem.
- **The solution - after - next principle:** Formulate an ideal solution (a vision), or an ultimate solution.

- **The systems principle:** Understanding the elements and dimensions of a system matrix allows one to determine, in advance, the complexities one must incorporate in the solution and its implementation.
- **The limited information collection principle:** Concentrate only on information having a direct bearing on solving the problem - not information related to the causes or results of the problem.
- **The people design principle:** The people who will solve the problem and use the solution must be involved and work together.
- **The betterment time-line principle:** Fix it before it breaks and monitor the process.

These principles are approaches or departure points - they are not 'steps' in problem-solving or decision-making. They can be used in any sequence suited to the particular problem or situation.

In the future, there will be a whole lot more information floating around. Customers and regulators will expect IT to know what is known, protect what is private and generate bordering-on- clairvoyant levels of service. The whole issue of IT and the law is going to be very big in the future (May, 2006:42). A few models are found in the literature study that can be related directly to information management change interventions. Huq, Huq and Cutright (2006:83) suggested the following change management principles when executing an information system project:

- Top management commitment is critical for projects.
- Employees must be educated by carefully crafted communication plans that offer enough lead times to get used to the re-engineered processes.
- Partnership between IS and process teams must be fostered.
- New ways of doing things will not take root unless a company makes a systematic effort to establish the new standard.
- Change review is an important part of the change management process that can guarantee process integration and reliability.

Markus and Benjamin (2003:118) suggested three change management models namely

- The traditional information system (IS) change-agent model (IS specialists, consider themselves change agents because they identify psychologically with the technology they create).

- The facilitator model (Many new information technologies provide greater opportunities to IS specialists who act as facilitators than to IS specialists who act as systems builders and technical experts).
- The advocate model (The distinguished features of this model is that change advocates work to influence people's behaviour in particular directions that the change agents view as desirable, whether or not the change 'targets' themselves hold similar views.

Information system specialists need to become better organisational change agents because change management will most likely become the largest and most important part of intra-organisational information systems work in the future. Even If an IT organisation is not making significant changes to its technology, the fact remains that change is occurring every day for one reason or another. Therefore, one must have a change management process in place that works (Sisco, 2001a:70).

3.9 Risk management

Risk management refers to the process of making decisions based on an evaluation of the factors that present a threat to the business. In IT, that means assessing company network's vulnerabilities and threat exposure, and taking the steps necessary to mitigate them (Littlejohn-Shinder, 2006:35; Strauss & Stummer, 2002;251; Peltier, 2004:44). The purpose of risk management is to analyze the business risks of a process, application, system, or other asset to determine the most prudent method for safe operation. Practically no system or activity is risk free, and not all implemented controls can eliminate the risks that they are intended to address. There are several different components to risk management (Littlejohn-Shinder, 2006:35):

- A risk management framework that describes areas of responsibility and the stream of accountability within the organisation or department.
- Risk analysis, a process of identifying vulnerabilities and calculating financial and loss expectancies metrics.
- A risk management plan, which lays out the way specific tools will be used to reduce the risk to an acceptable level.

Today nothing less is accepted than an accurate, comprehensive assessment, a thorough action plan, and an analysis and reporting capability that meaningfully and continuously reflects the impact of this risk management programme on the wellbeing of

the company. Common risk management tools typically focus on risk assessment and action plans. The risk analysis process has two key objectives: to implement only those controls necessary and to document management's due diligence. The challenge, however, would be getting instant feedback on corrective and preventive actions, monitoring the real-time status of risk management operational controls across the enterprise, and reporting on their overall impact.

Many organisations have become totally dependent on IT: vital business processes are supported or depend on IT. The failure or temporary unavailability of IT or one of its components could cause financial damage or even mean the end of the organisation (De Sutter, 2003:181). IT is any mechanism that facilitates the gathering of data, the transformation of data into information, and the communication and storage of information in the organisation. A successful IT project is not just the installation of a technical system, but also the institutionalisation of its use in the context of formal and informal structures and personal or group processes. Issues such as organisational behaviour, culture, structure and politics and the risks associated with these areas have to be considered if the project is to be a success.

No matter what size the business is, one should have a written business plan. Risk management should be a part of that plan, rather than a stand-alone project. And it should be looked at as an ongoing process, rather than a short-term project. Risks, especially in the IT area, are constantly changing. The steps involved in performing a risk analysis can be broken down into a few categories (Littlejohn-Shinder, 2006:35):

- Identifying the risks (in this case, the risks to one's organisation that are presented by its network).
- Determining the potential impact of the threats.
- Weighing the cost of safeguards against the impact of the threats.
- Making the decision on how to address risks effectively and cost efficiently.
- Implementing risk controls.
- Assessing effectiveness.

In the information security architecture there are four layers of risk controls. These layers begin with Avoidance, then Assurance, then Detection, and finally Recovery. Or one can create a set of controls that map to the enterprise such as Operations, Applications, Systems, Security, and so on. Mapping to some standard such as ISO 17799 is another option. When identifying possible controls, it could be beneficial to

categorize controls into logical groupings. ISO 17799 is actually "a comprehensive set of controls comprising best practices in information security." It is an internationally recognized generic information security standard (Peltier, 2004:44). Another way to map controls is by using some requirements from regulations such as Sarbanes–Oxley.

3.10 Asset management

The challenges for information management is to be able to collect, integrate and maintain the asset information and use the asset data for the benefit of the business. Asset management means different things to different people because most systems are as unique as the needs of their users. Many information management specialists think of IT asset management as information asset management due to the impact of IT on information management. Sisco (2002:4) defined IT asset management as the organisation, tracking, and support of the technology assets of a company. What this means is the following:

- **Organising** the assets by identifying all technology components of the company, their release level, and physical location of each item.
- **Tracking** all technology components using tools that allow for groupings of assets by location, by type of technology, by cost, etc. to assist management analysis and support.
- **Supporting** the technology assets by creating change management processes and having support resource information readily available when needed.

The asset must be something that is a physical item such as a printer or an item that can be copyrighted as in software or publication. Technology assets require different tracking methods and unique information is needed for different types of assets.

IT assets have great corporate value because of the information contained within them, and the consequences of not tracking them can be significant. Even so, many organisations treat them as disposable commodities that don't need to be secured. Gomolski (2006:44) suggests a number of practices applicable to IT asset management:

- Specify policies for IT asset procurement and security, and communicate them often to employees.
- Assign asset tracking and management responsibilities to someone in the organisation.
- Don't forget to include hardware and software assets when taking inventory.

- Use asset tags for physical devices.
- Recognize that IT assets have a useful life (or life cycle). Track and monitor where assets are in that life cycle.
- Develop a technology disposal policy that aligns with the organisation's overall compliance and risk plan. By employing sound asset tracking and management, organisations can improve their ability to protect customer information.

Sisco (2002:26) suggested a list of things which can help in management of IT assets:

- Tag the cable connections
- Label facility wall outlets for phone, data, and fax.
- Use a standard naming scheme for everything one does, including:
    - IP addresses
    - User ID's
        - E-mail
        - Network connectivity
        - Server access and business applications access
    - Phone ID's
    - Equipment ID and/or inventory identification
    - Facility department ID
    - External client ID
- Use memorable names for the organisation's servers and production printers and fax machines.
- Data is an asset of the company, normally worth more than all the other technology assets in the company. Ensure that there are excellent backup procedures and maintain off-site backup copies for recovery.
- Ensure that the computer room and other areas of the company with a large concentration of expensive computer equipment have fire extinguishers readily available and are tested annually.
- Develop and implement standard shutdown procedures for main components of the infrastructure during electrical storms, etc.
- Develop a disaster recovery plan. One cannot prevent a flood, tornado, or hurricane but one can control the time it takes to recover. It boils down to how much one is willing to pay for reliable systems recovery "insurance".
- Your company should have insurance riders to cover the more expensive equipment.

De Sutter (2003:378) emphasised the importance of having a Software Asset Management (SAM) policy. SAM will help information management to:

- improve the software planning and cost control;
- avoid legal issues;
- manage technological change;
- enhance information liquidity; and to
- justify investments in technology.

To cover compliance in the use of valid software licenses a sound Software Usage Policy needs to be created and communicated to the users. Software Usage Policy needs to incorporate the following elements (De Sutter, 2003:27):

- Standard software applications and products of the company.
- Guidelines for external software usage.
- The expectation that all software has an appropriate license.

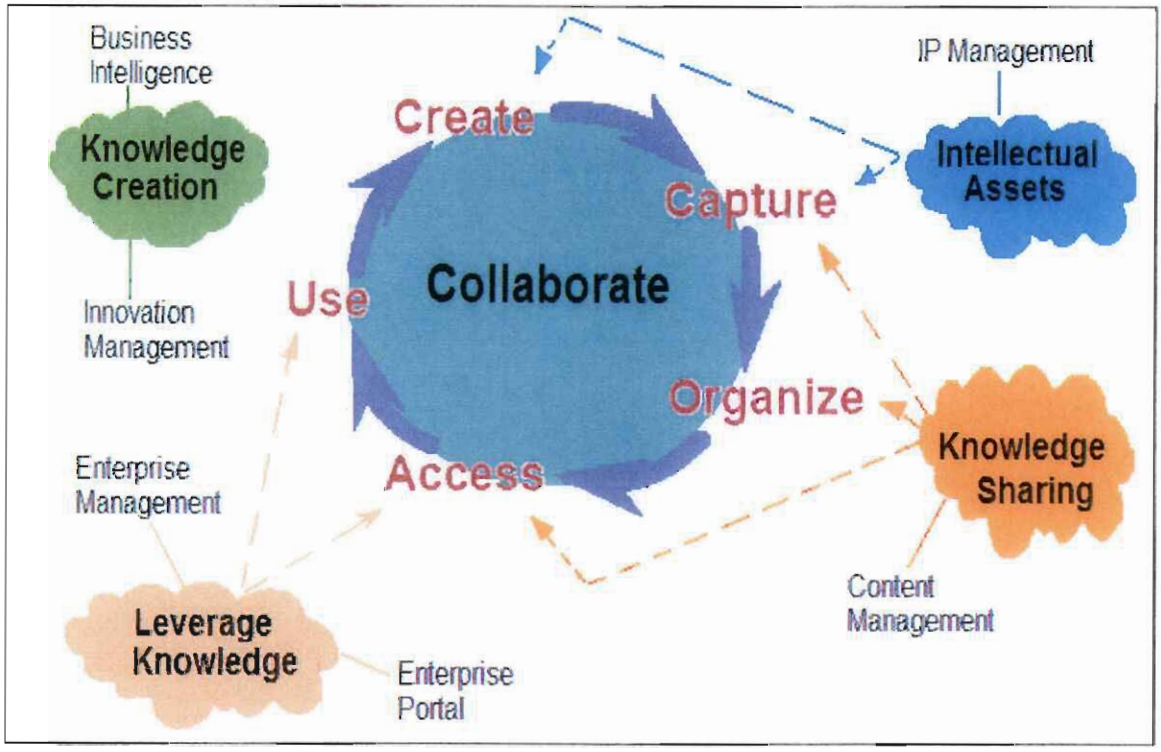
3.11 Knowledge management

The terms "data" and "information" and "knowledge" are often tossed around. Usually, they are considered to form a hierarchy, from data to information to knowledge. Knowledge Management (KM) focuses on how an organisation identifies, creates, captures, acquires, shares, and leverages knowledge (Rumizen, 2002:9). The definition of knowledge is a complex and controversial one, and 'knowledge' can be interpreted in many different ways. Much of the Knowledge Management (KM) literature defines knowledge in broad terms, covering basically all the "software" of an organisation. This involves the structured data, patents, programs and procedures, as well as the more intangible knowledge and capabilities of the people. It may also include the way that organisations function, communicate, analyze situations, come up with novel solutions to problems and develop new ways of doing business. Knowledge Management in an organisation can also involve issues of culture, custom, values and skills as well as the enterprise's relationships with its suppliers and customers (Fairchild, 2004:170). Heiser (2006a) described KM as a systematic process of finding, selecting, organising, distilling and presenting information in a way that improves an employee's comprehension in a specific area of interest. KM helps an organisation to gain insight and understanding from its own experience. Specific KM activities help focus the organisation on acquiring,

storing and utilizing knowledge for such things as problem solving, dynamic learning, strategic planning and decision making .

The Knowledge management framework as described by Logan (2006a) is presented in **Figure 3.3** below. Knowledge management (KM) is the creation, capture, organisation, access and use of an organisation's knowledge. Collaboration is at the heart of KM. KM cannot happen without collaboration (Logan, 2006a).

Figure 3.3: Knowledge management framework



Source: Adapted from Logan (2006a).

In an economy where the only certainty is uncertainty, the one sure source of lasting competitive advantage is knowledge. Knowledge is the most important asset for organisations today (Rumizen, 2002; Laudon & Laudon, 2003; De Sutter, 2003; O'Brien, 2004). As knowledge becomes a central productive and strategic asset, organisational success increasingly depends on the firm's ability to produce, gather, store, and disseminate knowledge. Many companies are building knowledge management systems (KMS) to manage organisational learning and business know-how.

As the field of knowledge management continues to gain momentum, it is crucial that there are adequate assessment metrics. Rumizen (2002:208) stated a number of

purposes for which one can produce measures that give information in context for specific reasons:

- The return on investment for their knowledge management projects, such as faster time to market, reduced costs, and higher customer satisfaction.
- Barriers to sharing knowledge.
- Success in gathering and using knowledge from customers.
- How people feel about knowledge sharing.
- The maturity level of their knowledge management effort.
- Progress in reaching their goals and achieving their strategy.
- The efficiency of the approaches being used.
- Identifying gaps in the approaches being used.
- An assessment of their intangible assets.
- The continuing health of their knowledge management system.

O'Dell, Odem and Wiig (quoted by Sookraj, 2002:14) carried out benchmarking studies among several prominent companies to determine knowledge management strategies. The study team discovered that companies use six primary strategies to address their KM needs:

- KM as a business strategy.
- Transfer the knowledge and best practices.
- Customer focused knowledge.
- Personal responsibility for knowledge.
- Intellectual asset management strategy.
- Innovation and knowledge creation.

Logan (2006a) suggested a few best practices related to KM:

- Automate business processes with business process management and capturing knowledge into rules and metadata.
- Develop a knowledge work process model for the company - define objectives, inputs, processes and outputs.
- Rethink the company assets and one's aspirations for leveraging "active assets".
- Make team productivity the organisation's first focus for knowledge worker productivity improvements.

Marcus and Watters (2002:178) also suggested a few best practices for KM:

- Provide access to data by all stakeholders.
- Present information in a format that is appropriate for the holder.
- Guarantee performance, availability, serviceability, and security.

There are a number of good best practices about knowledge management that organisations can use to enhance their performance through the identification, capture, validation, and transfer of knowledge.

3.12 Information security

The use of information technologies in business has had major impacts on society, and thus raises ethical issues in the areas of crime, privacy, individuality, employment, health, and working conditions (O'Brien, 2004:380). Recent changes in the Information Security industry have highlighted the need for organisation to protect their most valuable asset - Information. Siebenlist, Nagaratnam, Welch and Neuman (2004:353) emphasized the importance of rules regarding the security of information. Arguably the most important aspect in today's IT industry is security and, as users become more mobile than ever before - with more devices than ever before - it is the one topic at the forefront of everyone's mind. Most people realise that a simple anti-virus package is often not enough as hackers and crackers become more sophisticated. Proper security systems are often only put in place after an actual incident has occurred, or a threat detected - more often than not, too late (O'Brien, 2004:413).

Laudon and Laudon (2003:460) identified a number of controls designed for information security. These controls include software controls, physical hardware controls, computer operations controls, data security controls, controls over the systems implementation process, and administrative controls. A short description of these controls is given in **Table 3.1** below.

Table 3.1: Controls for information security

Type of control	Description
Software controls	Monitor the use of system software and prevent unauthorized access of software programs, system software, and computer programs.
Hardware controls	Ensure that computer hardware is physically secure, and check for equipment malfunction.

Table continues on page 58.

Table continues from page 57.

Computer operations controls	They include controls over the setup of computer processing jobs and computer operations, and backup and recovery procedures for processing that ends abnormally.
Data security controls	Ensure that valuable business data files on either disk or tape are not subject to unauthorized access, change, or destruction while they are in use or in storage.
Implementation controls	Audit the systems development process at various points to ensure that the process is properly controlled and managed.
Administrative controls	Formalized standards, rules, procedures, and control disciplines to ensure that the organisation's general and application controls are properly executed and enforced.

Source: Adapted from Laudon and Laudon (2003:460).

The most quoted standards for information security are ISO17799 and BS7799 standards. BS7799 became a standard in 1995. Initially it was the Code of Practice for Information Security Management (CoP). It was developed by Department of Trade and Industry in the UK, with the assistance of a group of leading international companies and organisations'. The objectives of the Code of Practice are twofold (Von Solms, 1999:56):

- to provide a common basis for companies to develop, implement and measure effective security management practice; and
- to provide confidence in inter-company trading.

The Code of Practice is based on ten categories that should be present in most companies. These categories are listed below in **Table 3.2.**

Table 3.2: Categories of the Code of Practice

Category No.	Description
1	Security policy
2	Security organisation
3	Assets classification and control
4	Personnel security
5	Physical and environmental security
6	Computer and network management
7	System access control
8	System development and maintenance
9	Business contingency planning
10	Compliance

Source: Adapted from Von Solms (1999:56).

A comprehensive set of security controls is listed under each of these ten categories. The controls are divided into a number of logical sub-groups and each sub-group is preceded by a concise summary of the objective and scope of the group of controls. In the Code of Practice, more than 100 controls are listed. Most of these controls are implemented by large, experienced organisations. These generally accepted controls are often referred to as baseline security controls. Collectively, these controls define an industry baseline of good security practice. Obviously not all controls will be applicable to every IT environment. The nature of the IT environment and the local circumstances will dictate which of these controls will be applicable in a specific environment. A sub-set of these controls are judged to be especially important and are referred to as the key controls. The key controls will be applicable to all organisations, and are considered as mandatory. The key controls usually provide a good starting point for introducing information security. These controls are listed below in **Table 3.3.**

Table 3.3: Key controls

Control No.	Description
1	Information security policy document
2	Allocation of security responsibilities
3	Information security education and training
4	Reporting of security incidents
5	Virus control
6	Business continuity planning
7	Control of proprietary copying
8	Safeguarding of company records
9	Compliance with data protection legislation
10	Compliance with security policy

Source: Adapted from Von Solms (1999:57).

Pabrai (2004:34) stated the importance of SOX compliance. The legislation has specific impact in several areas of security, including:

- Designing and implementing security controls such as those in the area of Information Asset Management (IAM).
- Documenting security policies.
- Auditing systems that process sensitive information.
- Security awareness training.

Many elements of information security have essentially been "solved." It's a matter of implementing the solutions efficiently and effectively (Heiser, 2006b).

3.13 Business processes

Information systems in the real world typically are integrated combinations of cross-functional business systems. Such systems support business processes, such as product development, production, distribution, order management, customer support, and so on (O'Brien, 2004:163). The purpose of a process is to transform input into output. This transformation is done through the support of resources (money, people, infrastructure, information and according to predefined specifications (De Sutter, 2003:194). Wu (2004:42) emphasised the importance of understanding of core and infrastructure business processes when defining the information enterprise. In a high-tech company, sales and manufacturing tasks are core business processes while payroll and purchasing are infrastructure business processes. By understanding the detailed tasks that constitute the business processes, an organisation can define business terminology, meta-data and rules for creating metrics. Business processes provide the logical flow and context in which data is generated, processed and analyzed. The foundation for all information processes is effective, well-documented and understood business processes. In an information enterprise, individuals make decisions based upon the information that they have available.

The management of business and operations in larger organisations is becoming infinitely more challenging and complex. Managing effectively means understanding where and how value is created in the business, and responding more quickly to market changes and opportunities. Business transformation requires changing one or more of one's core business processes to improve the strategic or competitive position. According to Bitterer (2006) there's a continuum of business transformations:

- *Process-focused optimisation:* Incremental and adaptive enhancements to optimize the performance of core or noncore business processes.
- *Management led re-engineering:* Processes are redesigned to reflect changes in the business environment (trends) and to implement new best practices.
- *Strategic business transformation* is at the extreme end of the enhancement continuum.

Business processes provide the logical flow and context in which data is generated, processed and analyzed. The foundation for all information enterprises is effective, well-documented and understood business processes. In an information enterprise, individuals make decisions based upon the information that they have available. Because good business decisions are based upon information and information is data with context, well-defined and understood business processes are required (Wu, 2004:43).

De Sutter (2003:215) suggested a few principles applicable for a business transformation:

- *Create a unified view of the business objects* (unique identification system is the absolute minimum to exchange information between processes and supporting information systems).
- *Apply the self-service concept where possible (*often, processes can be simplified and made more efficient by applying the self-service concept).
- *Build generic solution (*hard coded logic should be avoided at all cost)
- *Take care of the exceptions (*the models are never perfect, users ate human beings who need a certain freedom of action and, finally: no system is perfect and fails from time to time).
- *Make a lightweight Information System (*lightweight information systems will need much less maintenance than programs that handle exception).

Understanding and enabling business processes is critical to providing relevant, timely and accurate information to individuals. As a component of an information enterprise, business processes must be understood in order to create a meaningful information environment (Wu, 2004:42). Creating a culture that embodies information management practices will allow technology to be used in such a way that enhances business processes and supports the organisation in terms of information management and retrieval challenges (Myler, 2005:20).

3.14 Balanced scorecard

The Balanced Scorecard (BSC) initially developed by Kaplan and Norton is a performance management system that enables businesses to drive strategies based on measurement and follow-up. In recent years the BSC has been applied to IT. The IT BSC is becoming a popular tool, with its concepts widely supported and dispersed by international consultant groups such as Gartner Group, Renaissance Systems, Nolan Norton Institute, and others. As a result of this interest, the first real-life applications are starting to emerge (Van Grembergen, Sauli & De Haes, 2004:129). The Balanced Scorecard is a powerful framework for aligning strategic objectives, management

systems and corporate performance, resulting in robust long-term growth and value creation. The framework is illustrated in the **Figure 3.4** on page 63. Implementing the Balanced Scorecard successfully is a function of five core principles: mobilising change through executive leadership; translating strategy into operational terms; aligning the organisation to the strategy; making strategy everyone's everyday job; and making strategy a continual process. The Balanced Scorecard enables organisations to become more adaptive and responsive to the needs of both internal and external constituencies, resulting in greater opportunities for problem solving and innovation.

Kaplan and Norton (2002:303) researched and revealed a set of five principles, built around the Balanced Scorecard system that enables organisations to execute their strategy rapidly.

Principle 1: Mobilise change through executive leadership.

The single most important condition for success is the ownership and active involvement of the executive team.

Principle 2: Translate the strategy into operational terms.

The scorecard provides a framework for organising strategic objectives into four perspectives:

- Financial
- Customer
- Internal business processes
- Learning and growth

Principle 3: Align organisation to the strategy.

The Balanced Scorecard is a powerful tool to describe a business unit's strategy.

Principle 4: Make strategy everyone's everyday job.

This is top-down communication and bottom-up implementation. Three processes are required:

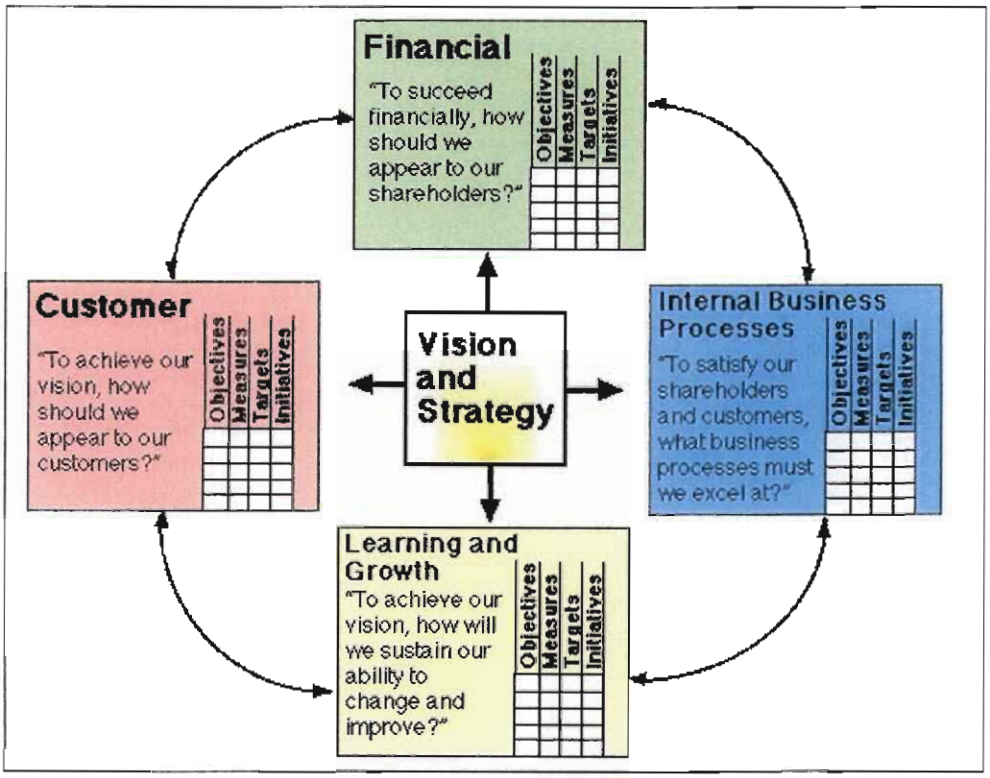
- Use communication and education to create awareness.
- Align personal objectives with the strategy.
- Link compensation to the scorecard.

Principle 5: Make strategy a continual process.

Companies adopt a new "double-loop process" to manage strategy. The first step links strategy to the budgeting process. The second step introduces a simple management meeting to review strategy.

The Balanced Scorecard is a powerful framework for aligning strategic objectives, management systems and corporate performance, resulting in robust long-term growth and value creation. The five principles suggested by Kaplan and Norton (2002:303) can be easily applied for organisation information management strategy.

Figure 3.4: The Balanced Scorecard framework



Source: Adapted from Value Based Management (2006).

3.15 Benchmarking

Benchmarking is a process of creating business knowledge by comparing and analyzing business information about other companies with the goal of improving the quality of decision-making. De Sutter (2003:115) stated that organisations can benefit from benchmarking due to the following reasons:

- It prevents reinventing the wheel (Why invest the time and costs when someone else have done it already and often better, cheaper and faster?).
- It accelerates change and restructuring by:
    - Using tested and proven practices.
    - Convincing sceptics who can see that it works.
    - Overcoming inertia and complacency and creating a sense of urgency when gaps are revealed.
- It leads to out-of-the-box ideas by looking for ways to improve outside of the industry.

Prašnikar, Debeljak and Ahčan (2005:258) summarised the following common characteristics of contemporary benchmarking:

- its key purpose is to gather various types of business information about other companies;
- the purpose of this information is to create new business knowledge;
- new business knowledge is gained by analysing and comparing the specifics of various business factors of different companies; and
- on this basis, companies can make better business decisions and consequently enjoy more successful and more effective business.

Benchmarking is used at a number of levels (Spenley, 2002:295):

- Strategic benchmarking. Strategic action teams use benchmarking to drive continuous improvement and refine the overall business strategy.
- Competitive benchmarking. For each major business driver, the competitive position is measured against the competition.
- Customer benchmarking. Customer perception is all there is – customers never buy just a product. Customer benchmarking enables a business to understand the views of their customers about the organisation, relative to the competition.
- Financial benchmarking. Key performance measures and the establishment of rankings for each measure. Return on net assets (RONA) identifies which business drivers will deliver the greatest return on the investment needed.
- Best practice benchmarking. The minimum process to meet the business driver requirements for time and cost to meet the required outputs.

For benchmarking to succeed (Spenley, 2002:295):

- The leadership of the organisation should establish teams to lead the process, learning and acting on the results:
    - The *strategic action team* is responsible for the strategic direction of the business and needs to review this at monthly meetings.
    - The *customer benchmarking team* should be cross-divisional and multi-level and include people at the sharp end of customer contact.
    - The *business process teams* are the teams within the company that should have improvement targets.
- Comprehensive and accurate information on competing businesses needs to be available.
- The firm's internal auditing procedures need to be effective. First, the business needs to understand how they operate in relation to the organisations that are being benchmarked. Second, the organisation needs to be able to understand how effective any changes have been.
- The benchmarks – or performance measures – that are established need to be based on industry best practice. These may differ from the targets set by the firm's business units departments which may be easily attainable or simple irrelevant. However, the benchmarks should directly relate to the company's overall business plans.
- Finally, the benchmarks that are established must be flexible and able to change with the external environment.

The significance and value of benchmarking lie in the fact that building and sustaining a successful business is a battle to keep ahead of the competition. The benchmarking practices identified by Spenley (2002:295) can be applied to any type of environment including information management domain, especially in strategic and best practice benchmarking levels.

3.16 Business intelligence

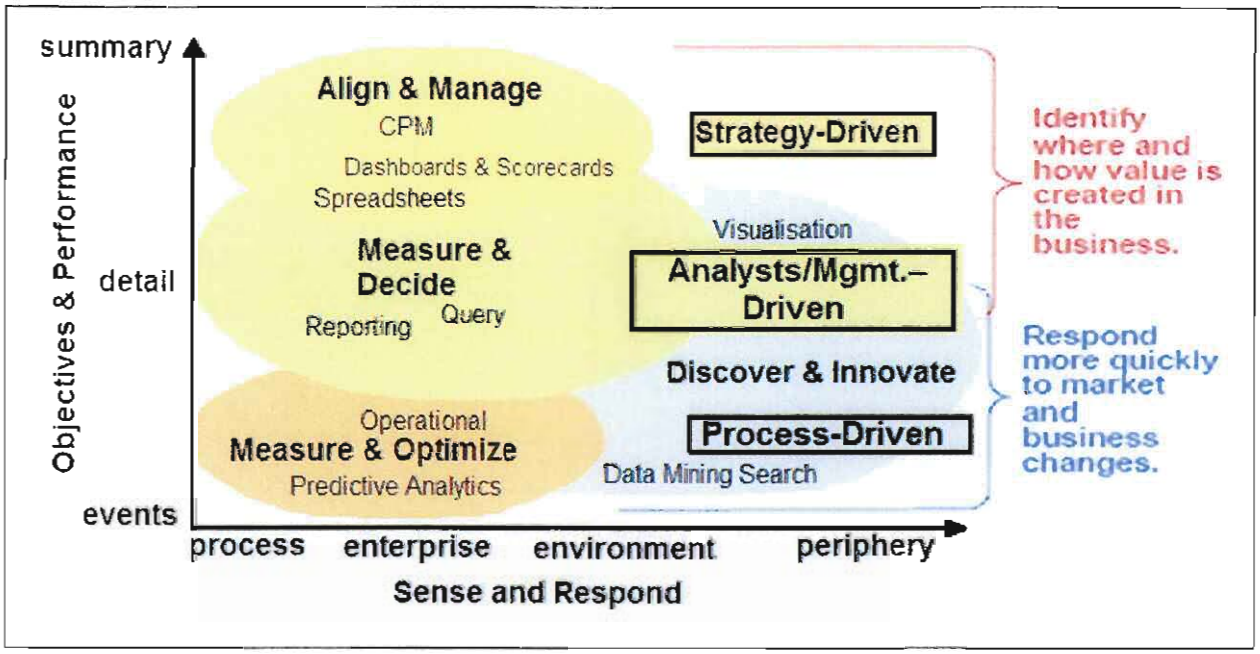
A common perception of Business Intelligence (BI) is that it is an analytical activity applied to financial information for added insight into company performance (Gibson, 2006: 26). Based on a survey, Herschel & Jones (2005:45) stated that 60 percent of consultants did not understand the difference between BI and knowledge management.

Herschel and Jones (2005) described BI as a decision-making process using data warehousing and online analytical processing techniques (OLAP). Data warehousing collects relevant data into a repository, where it is organised and validated so it can serve decision-making objectives. The various stores of the business data are extracted, transformed and loaded from the transactional systems into the data warehouse. The wider definition of BI comes from Hill and Scott (2004:49). They describe BI as a set of concepts, methods and processes to improve business decisions, using information from multiple sources and applying experience and adding assumptions to develop an accurate understanding of business dynamics. It is the gathering, management and analysis of data to produce information that is distributed to people throughout the organisation to improve strategic and tactical decisions. They state that BI involves the integration of core information with relevant contextual information to detect significant events and illuminate cloudy issues for management decision-makers. It includes the ability to monitor business trends, to evolve and adapt quickly as situations change and to make intelligent business decisions on uncertain judgments and contradictory information. BI is creating knowledge from openly available information by use of a systematic process involving planning, collection, analysis, communication and management, which results in decision-maker action. BI is a broad category of applications and technologies for gathering, providing access to, and analyzing data for the purpose of helping enterprise users make better business decisions. The term implies having a comprehensive knowledge of all of the factors that affect the business (Searchtorpedo.com, 2006). The common view is that BI is a set of business processes for collecting and analyzing business information, the technology used in these processes, and the information obtained from these processes. BI makes the right information available in the right format, to the right person, at the right time. It goes way beyond the traditional arena of presenting historical information to business decision-makers and it is deeply embedded in many organisations' most critical business processes. Today, most BI applications include development capabilities (BI infrastructure, metadata management, Web services integration, programmatic development environment, visual development environment, pre-packaged data models, pre-packaged business content and business rules) and end-user capabilities (reporting, dashboards, scorecards, ad-hoc queries, OLAP front ends, integration with other software, advanced visualisation, collaboration and workflow (Bitterer, 2006).

Many companies are already using BI to measure and drive decisions within their organisations. During the past two or three years, many organisations have adopted

corporate performance management (CPM) and leveraged the integration with their BI platforms to drive alignment between strategy and execution (Bitterer, 2006). Such a business intelligence scenario is illustrated in **Figure 3.5** below. The expanding role of analytics driving process optimization is being enabled by predictive analytics and data mining, in concert with traditional BI capabilities tightly coupled with business rule engines, to make the insight useful within the process context and needed process decision time frames.

Figure 3.5: Business Intelligence Scenario



Source: Adapted from: Bitterer (2006).

Organisations implementing a BI solution will be faced with a wealth of choices. The right choice will depend on each enterprise's specific requirements. Pratte (2006:70) outlined a number of critical elements that an organisation should consider before proceeding to a BI solution:

Commitment: Enterprises pursuing BI solutions should make a serious commitment at senior levels, or the project is doomed to fail before starting. This containment is not only a matter of money but of resource allocation and authority.

Implementation partners: One of the biggest mistakes organisations can and usually do make is to try to build a BI solution on their own. One should undergo an honest self-evaluation of one's own capabilities. Executed correctly, BI projects are massive efforts requiting specialized skills and significant resources. By partnering with experienced

consulting groups or vendors, significant cost savings can be appreciated, while at the same time producing better deliverables.

Goals and objectives: An organisation should ask itself, "What do I want my BI system to do for me?" Answering the question will mean hours of meetings with business stakeholders to gain an understanding of what is needed.

Scope: Many BI efforts fail to define scope. Ensure that project requirements include input from all organisational entities. Don't fall for the low-cost approach of building targeted solutions aimed at providing integration with only some of the enterprises stakeholders.

Infrastructure analysis: While determining what it will take to build a solution, one should review the organisation's IT infrastructure to ensure that the proposed solution will leverage current applications.

Support and training: Issues of system support and end-user training are often overlooked, but they should be resolved. Support and training can be supplied in-house or by contracting with external vendors.

Additional or specialized resource needs: Not only does the organisation have to build it but it should also maintain it. This will require acquisition of new technical talent with specialized skills.

Design: Hire a system architect with experience designing enterprise-wide BI solutions. An architect can develop an accessible foundation so that corporate information can be rapidly extracted and delivered across the enterprise.

Tools: Acquire appropriate tools for querying and analyzing data, including visualisation, communication, Online Application Processing (OLAP), etc.

Planning the implementation phase: Create a project plan that documents outstanding incidents, schedules, project dependencies and risks.

Security: Security is both a regulatory and legal issue to data access. Security should be considered early in the requirements phase. Failure to do so could cause serious financial cost and project goodwill.

BI becomes a top initiative and investment priority for Chief Information Officers (CIOs) and Chief Executive Officers (CEOs). Many organisations view BI as "the use of information that enables organisations to best lead, decide, measure, manage and optimize performance to achieve efficiency and financial benefit". BI's value is more than information dissemination; it's highly linked to achieving business goals. Bitterer (2006) believes that BI capabilities will become more pervasive in operational and workplace applications as organisations seek to leverage BI to lead, support decisions,

explore measure, manage and optimize their businesses, and thereby drive business transformation.

3.17 Virtual collaboration

The potential benefits of virtual collaboration are no longer a secret. There are measurable time savings in developing products, answering customer needs and distributing information. Global teams learn on the fly, apply new knowledge to products design and tap into each other for mentorship and expertise. Prentice (2006) argued that we live in a decade of "digital natives". They know how to use technology and use it automatically. They are comfortable in a virtual society and have different work and life balance and value sets. They belong to a complex non-geographic social network and collaborate across time and space. Continuing growth of electronic communications fuels growing virtual communities and realistic virtual environments for collaboration. Foti (2004:28) identified the following characteristics of virtual collaboration:

- Virtual collaboration technology helps companies improve global performance, but only if the project team is ready to take advantage.
- With multiple stakeholders at varying comfort levels, establishing rapport and trust among the project players can be challenging.
- One should recognize the limitations of the staff, the infrastructure and the customers' capabilities to choose a system that works.
- To build an efficient network, one should establish how all team members will use the system. Technology can hide conflict and doesn't guarantee solid change management.
- Before making an investment, take the time to research the options - best-in-class may be more advanced than one really needs.

Collaboration technologies refer to a set of technologies that enable one to share information, work together remotely, and manage content. They may include a central Web or intranet portal that serves as a document or pricing data repository, or these collaboration systems can consist of real-time communications tools that enable co-workers to chat and share ideas for a project instantly (Dawson and Clements, 2004:51). Now that people have become adept at using basic tools such as PCs and e-mail, they can take advantage of new technologies that provide even greater connectivity with each other and with information, regardless of location or computing environment (Dawson and Clements, 2004:50).

The following guiding principles were identified by Qureshi and Zigurs (2001:88) for virtual collaboration:

- Develop and communicate norms across remote and diverse units.
- Develop and sustain shared goals within diverse groups.
- Identify and support interaction of like-minded individuals or special interest groups across traditional boundaries.
- Foster exchange of personalized knowledge.
- Expand boundaries of knowledge beyond the organisation's walls.
- Mobilize distributed resources quickly.
- Match people and other resources to rapidly changing needs.

Sumner (2003:12) suggested the following principles to be applied when doing collaboration:

- *Know how virtual collaboration fits with the company's goals*: the company may not need a portal; e-mail may be enough.
- *Don't start with technology:* employees must have a reason to collaborate.
- *Start small:* the most visible benefits come to organisations with modest and clear goals.
- *Don't neglect change management:* launching collaboration technology across a global organisation (usually in the form of an intranet) is difficult and requires dedicated oversight, with attention to strategy and change management.

Clegg, Hermanes and Porras (2002:168) argued that success for virtual collaboration comes from:

- optimizing the value chain;
- achieving time to market;
- creating effective governance mechanisms;
- measuring progress and effectiveness;
- processing the inputs of environmental, market, and customer knowledge and expertise;
- delivering barriers that lock out competitors;
- following an open-system model;
- incorporating innovation and entrepreneurship;

- spanning boundaries between industries; and
- blurring the lines between suppliers, customers, and the firm.

Management motivation has a direct effect on virtual collaboration. Collaborative roles emerge, but must be made more explicit. Tasks that benefit most from virtual collaboration are those requiring knowledge sharing, structure, and detailed team. Cultural diversity can enhance the value of virtual collaboration. Training is important for successful virtual collaboration and successful training programs put work practices at the forefront. Most of the principles and best practices (Qureshi and Zigurs, 2001; Sumner, 2003; Clegg *et al.*, 2002) are applicable for information management discipline especially those related to governance, measuring progress and incorporating innovation.

3.18 Findings of literature study

Information management best practices falls under various themes: vision and policy, change implementation, alignment of information management strategies business strategies, business process re-engineering, the review of new systems and IT infrastructure. They can be described as a policy, procedure, process, technique, tool or methodology that, through experience and research, has proven to reliably lead to a desired result. The information management best practices found in the literature study were listed in **Appendix A** (Questionnaire - Part 2). The elements of information management that appear the most frequent in the literature study indicate that authors place high priority on the following components:

- Information security
- Information management governance
- IT standardisation
- Regulatory requirements for information management
- Business intelligence
- Virtual collaboration
- Management of service outsourcing
- Selection of service providers
- Project management
- Change management

- Risk management
- Asset management
- Knowledge management
- Business processes
- Balanced scorecard
- Benchmarking
- Competitive Intelligence
- Business partnering

Information security covers the whole range relating to identifying and managing security of information. One of the most important responsibilities of the management of a company is to assure the security and quality of its IT-enabled business activities. Identifying the most effective set of security controls has always been a problem. Findings from the study indicated that best practices related to information management security are identified as necessary software and hardware controls, data security, virus control implementation, assets and personnel security. They also extend to system access controls, information security, document controls, auditing, and educational training systems.

Information governance is an area of which the information professional needs to become much more aware of. Effective information management governance requires a significant amount of management time and attention. Many aspects of information management governance require business management to actively participate and, in some cases, assume primary responsibility. Senior management needs to understand information management governance. It is very important that information management governance is linked to enterprise governance.

Information management best practices related to IT standards have become significant due to a number of factors (IT Governance Institute, 2005:11):

- The need to optimise costs by following, where possible, standardised rather than specially developed approaches.
- The growing maturity and consequent acceptance of well-regarded frameworks such as COBIT, IT Infrastructure Library (ITIL), ISO 17799, ISO 9001, CMM and PRINCE2.

- The need for enterprises to assess how they are performing against generally accepted standards and against their peers.

The control objectives for information and related technology (COBIT) bridges the gap between IT and business management, providing a common language that all parties can understand. It helps companies to comply with corporate governance requirements and helps to lower the cost of doing business. The Sarbanes-Oxley Act of 2002 protects investors by improving the accuracy and reliability of corporate disclosures. Due to the availability of reliable technology, most responsible companies have already regulated themselves. They put security and privacy policies as well as document retention policies in place. They comply with financial regulations. Even though that IT can assist with compliance, this does not mean that it comes cheap.

Business intelligence (BI) is often defined as the discovery and explanation of hidden, inherent and decision-relevant contexts in large amounts of business and economic data. Partnering with experienced consulting groups or vendors is certainly a good practice. The selection of appropriate tools for querying and analyzing data is very important for processing and utilizing the relevant knowledge. Companies involved in BI processes need to have support and training in place.

Virtual collaboration depends on established rapport and trust among the stakeholders involved in the process of virtual collaboration. An efficient network needs to be built for exchange of personalised knowledge. It is good practice to identify and support interaction of like-minded individuals or special interest groups across traditional boundaries. There are three keys to culture change when adopting collaboration technology (Sumner, 2003:13):

- management has to support it;
- training must be available; and where possible
- customized to fit the workplace.

It has been found from the literature study that there are significant risks associated with outsourcing of customer service. The biggest danger of outsourcing is that a company will outsource too many or the wrong types of activities and thereby diminish its own capabilities. Companies should first explore outsource of customer services to inshore

locations before going to offshore locations. Pilot testing is crucial before signing long-term outsourcing contracts.

An IT outsourcing partnership consists of an outsourcing relationship and one or more external IT suppliers and the relationship between them. Managing an IT outsourcing relationship requires substantial effort from both the outsourcing organisation and the IT supplier. When selecting a service provider, the option 'multiple suppliers' gives more flexibility with regard to switching service providers. Technology expertise and project management experience are vital components to consider when selecting a service provider.

Project management can be defined as planning, directing, and controlling resources (people, equipment, material) to meet technical, cost, and time constraints of the project. Measuring the progress of an information management project is difficult as the work only becomes visible at the end of the project, maybe when it is too late to correct mistakes. Project management has established itself as a discipline and has a number of best practices: rank project elements upfront and avoid big bangs; limit the size of the project teams as the small teams have less communication problems; fit the methodology to the project, not the other way around; separate concerns - technical people should make technical choices and functional people should make functional choices and involve the users when executing a project.

Change management models and theories describe the activities necessary to modify strategies, structures, and processes to increase an organisation's effectiveness. The change is critically dependent upon the attitude, behaviour and response of people to change. The change needs to be managed, and the effects on the critical factors need to be assessed. Managing change within the context of information management will mean aligning business goals to maintain a strategic link between new processes in information management and overall business strategy. The management commitment to information management projects is vital for success of projects. The other best practices include: clarifying the need for change; involving all stakeholders; treating each problem as unique and; focusing on the purpose of problem-solving.

Risk management is about detecting what could go wrong and planning what to do if it does. The best practices for risk management indicate that organisations need to have

a written business plan where risk management is a part of it. Risk management framework needs to be implemented. Risk controls should be mapped to regulations such as Sarbanes–Oxley and, risk analysis should be applied when assessing the risk.

The literature study emphasizes a need to get control over the growing number of information management assets spread across the companies. The principles of asset management that apply to buying IT equipment are fundamentally different from those of buying non IT equipment. There is a growing requirement to manage IT assets throughout their life cycle. The best practices related to asset management are: defined policy for IT asset procurement and security; tracking and monitoring the asset's life cycle; technology disposal policy in place and; defined and tested disaster recovery plan.

Knowledge management is the systematic processes, by which knowledge needed for an organisation to succeed is created, captured, shared, and leveraged. Knowledge management systems facilitate organisational learning and knowledge creation. Effective business decisions depend on the acquisition, processing and utilisation of relevant knowledge. Some information or knowledge is simply more valuable and more sensitive than other information. It is crucial to have regular assessment of the company's intangible assets, develop an intellectual asset management strategy and automate business processes for capturing knowledge into rules and metadata.

Understanding and integrating core and infrastructure business processes helps to define the information enterprise. Business process re-engineering is giving way to business process fusion and business process innovation. Companies need to standardise on software for capturing business processes. The business processes have to be documented and change control for business processes needs to be in place.

Given that the balanced scorecard approach was formulated before IT became such a dominating factor within every organisation, it is not surprising that amendments have to be made to make use of the balance scorecard methodology. This is carried out by the introduction of an IT balanced scorecard. The balanced scorecard has been applied to

IT in order to ensure that IT is fairly evaluated. The guiding principles for the balanced scorecard are those which include financial, customer satisfaction and learning and growth measures.

Knowing the scope and power of benchmarking is a strategic imperative in any business, as it allows existing businesses to defend their position, as well as to attack new business opportunities. It is essential to establish teams to lead the process, learning and acting on results in the process of benchmarking. Comprehensive and accurate information on competing businesses needs to be available during the benchmarking process. Benchmarks should directly relate to the company's overall business plans. Benchmarks that are established must be flexible and able to change with the external environment.

Competitive intelligence, if it is to be effective, is dependent on high quality information. This, understandably, can only be derived from a high-quality data resource. Information management needs to have an in-depth understanding of the business which will enable sound solutions to business challenges. Competitive intelligence requires a tailored infrastructure and correct placing, using the right people and ensuring sustained focus on key intelligence needs with proper in-depth analysis. Continued sensitising and marketing are needed for the success of competitive intelligence.

As a business partner information management would need to provide the business with strategic systems to enable the competitive edge to occur; understand exactly what key operational systems are needed to effectively carry out business; provide support systems which will reduce cost and raise efficiency; actively participate in the business; consistently align business strategy to information management strategy and understand that information management needs to have common objectives to that of business. Business partnering means in-depth understanding of the business where the business is provided with strategic and support systems and where information management strategy is aligned to business strategy.

3.19 Summary

New technologies are constantly under development. A technology may even become outdated before a complete implementation plan is developed. What is needed is recognition of the importance of an overall information management strategy that may be accomplished, or enabled, by existing, new, or emerging technologies and innovations. Most of the information management standards are still generic and are intended to be applicable to all organisations, regardless of type of industry. The business enterprises are vulnerable to data loss, lost productivity, decreased profits, opportunity costs, privacy concerns and corporate liability. Publicly held companies have additional accountability for the integrity of their financial reporting data and systems. The twenty-first century is often being described as the era shaped by laws. Consider the effects of Sarbanes Oxley, King II and the Electronic Communications and Transaction Act on a company. A company has no choice but to comply. Unfortunately compliance can become very expensive. In order to reduce this cost, and improve the conformance to the various regulatory bodies, a thorough information archiving and retention strategy is needed. To make a society prosper, one needs rules (both written and unwritten), understanding of good and bad behaviour with its consequences and accountabilities, acknowledgment of cultural differences in behaviour, initial trust and earned trust, identification of the risks associated with transactions, and so on. Businesses need guidelines or governing documents to formalise information access and handling processes, and to provide protection from liability if a leak occurs. Information management governance should be aligned with business governance. Good corporate governance is important to professional investors. Major institutions rank corporate governance on par with the firm's financial indicators when evaluating investment decisions. The current society is a knowledge-driven society, where knowledge is the key resource, and knowledge workers are the dominant work group. IT will continue to have a significant effect by facilitating the spread of knowledge almost instantly to vast numbers of people in different parts of the world.

CHAPTER 4: EMPIRICAL STUDY

"Effective IT governance requires a significant amount of management time and attention".

- Peter Weill

4.1 Introduction

The objective of this chapter was to describe the research methodology that was followed and how the study population and sample was selected. This chapter also explains how the most important quantitative criteria were developed. The testing of these criteria in the broad base industries is also discussed.

4.2 Methodology and approach used for empirical study

The main objective of the empirical study was to investigate the perception of Information Management (IM) best practices in broad base industries. The empirical study was conducted in six phases, namely:

Phase 1: Establish a framework of information management best practices in broad base industries.

Phase 2: Develop a preliminary measuring instrument to investigate the perceptions of the sampling population on information management best practices.

Phase 3: Pilot study in the development of questionnaire

Phase 4: Investigate perceptions of information management best practices in broad base industries.

Phase 5: Describe the information management best practices in broad base industries.

Phase 6: Compare the perception what the information management best practices are as perceived by companies from broad base industries.

The empirical study also provided the basis for refining the framework of information management best practices as well as developing a suggested model that can be adopted by organisations in broad base industries. To achieve these goals a

questionnaire was designed and sent to three different groups of people from organisations in broad base industries. The broad base industries consist of:

- Primary sector
    - Mining
    - Oil and gas
- Secondary sector
    - Basic and general industries
    - Cyclical consumer goods
    - Non-cyclical consumer goods
- Tertiary sector
    - Cyclical services
    - Non-cyclical services
    - Utilities
    - Financials
    - Information technology

The target population consisted of: managers and specialists from IM/IT, financial and business management background.

4.3 Proposed framework of information management best practices to be tested

After considering the results of the literature study, it was evident that a number of information management components appeared to be important to companies to ensure better management of their information assets. **Table 4.1** below gives a list of these important information management components.

Table 4.1: Summary of important information management components

INFORMATION MANAGEMENT COMPONENT
Information security
Information management governance
IT standardisation
Regulatory requirements for information management
Business intelligence
Virtual collaboration

Table continues on page 80.

Table continues from page 79.

Management of service outsourcing
Selection of service providers
Project management
Change management
Risk management
Asset management
Knowledge management
Business processes
Balanced scorecard
Benchmarking
Competitive Intelligence
Business partnering

Each of these information management components has an associated list of best practices for information integration, business intelligence, information compliance, data quality, recognised standards, and so forth.

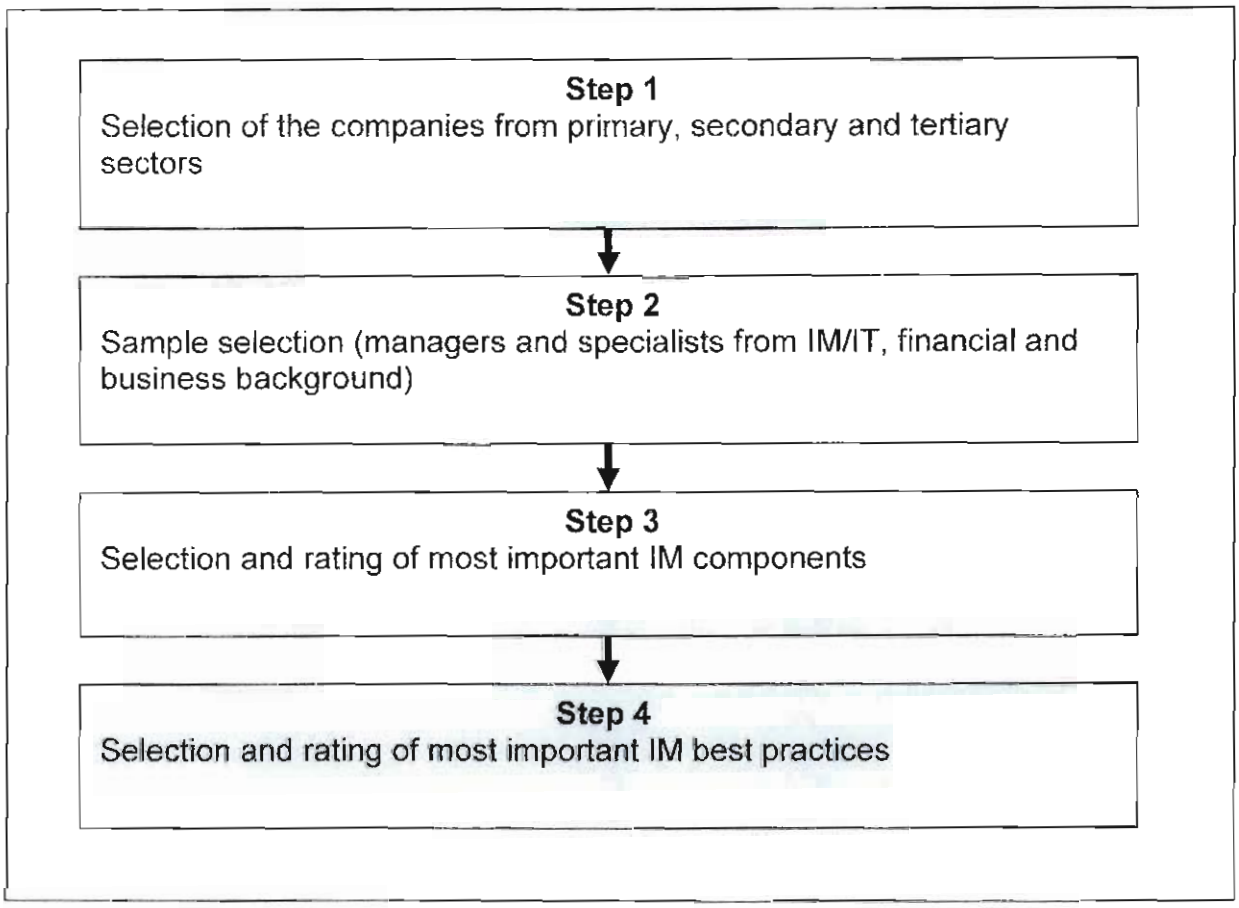
These information management components are the base for creating an information management framework in an organisation. When implemented the framework will include:

- Information management strategies and priorities
- Provision of a vision, goals and principles for the management of information
- Effective and efficient management of information in an organisation
- A disciplined approach to managing information assets
- Provide governance and accountability models
- Guidelines to best practice for relevant business functions to improve business delivery
- Legal and financial compliance
- Mapping out the landscape for managing information
- Templates to help record key information
- Business metrics to help measure and report on the quality of information resources
- Tools to help in the management of information assets within the organisation
- Better communication within the organisation in regard to information management.

It is proposed to test the perception of the sampling population from broad base industries in South Africa regarding information management best practices and

compare it with the findings in the literature study. The test will have four steps. They are illustrated in **Figure 4.1** below.

Figure 4.1: Steps for testing proposed framework



4.4 Design of questionnaire

The questionnaire was sent out to various people within the broad base industries. This include: IM/IT managers and specialists; chief financial officers (CFOs) and financial specialists; and chief executive officers (CEOs), operations managers, maintenance managers, plant managers, marketing managers and other personnel from business units that can benefit from information management. Data from respondents' feedback were used in determining the final framework and the proposed model for information management best practices in broad base industries. **Appendix A** contains a copy of the questionnaire sent. The questionnaire consists of a cover page and the actual questionnaire. The intent of the cover page was to inform the respondent about the questionnaire and provide the channels of feedback that could be used for the reply. The purpose of this study was explained and clarification on the use of the information

was given. Respondents were requested to complete a questionnaire. The questionnaire comprised five-point Likert-type and open-ended questions. Respondents were assured that the information obtained would be treated as confidential and that results would be used for research purposes only. The main purpose of the questionnaires was to test both the literature study as well as to investigate the perception of information management best practices in broad base industries. An online website was developed to make it easier for participants to partake in the survey regarding Information Management: Best practices in broad base industries. The example of an e-mail sent to participants for the online survey can be found in **Appendix C**. The actual questionnaire was divided into four categories. Each category asked specific questions/statements to identify perceptions about important components of information management as a discipline, and to select the most important best practices within information management. The categories are shown below:

- Part 1 - respondent employment category.
- Part 2 - important components of information management.
- Part 3 - best practices for information management.
- Part 4 - type of the industry.

The rationale of each of the categories is explained below to create a common understanding and to minimise different interpretations.

Respondent employment category: The primary reasons for asking these questions were to identify whether the respondent is an employee of the IT/IM department, the financial department or belongs to the company's management team.

Important components of information management: This section consists of eighteen components of information management identified through the literature study. It provides a base for gauging what is the perception of most important components of information management in the broad base industries.

Best practices for information management: The questions presented in this section were to determine what the information management best practices are as perceived by IM/IT specialists, financial managers and business managers from companies in the broad base industries.

Type of the industry: The purpose of this section was to determine the type of industry that the respondent works in.

Name of the company: The main reason for asking this question was to identify companies in the broad base industries and relate them to the industry's primary, secondary or tertiary sector.

Two experts from the information management field were asked to determine the simplicity of the questionnaire and whether additional items needed to be included. They have been asked to indicate whether they do not understand the questionnaire's instructions, the meaning of the questions, and the meaning of any words in the questionnaire.

4.5 Determination of the study population

Sampling design is very important due to the fact that if the sample is selected appropriately it can provide the desired degree of accuracy without the necessity of testing the whole population. The term target population within this study refers to the group of companies listed in the book 'Top 300 national companies'. Each year, Top Companies Publishing and Events recognises the top performers of the year in business individuals and companies, in the Top 300 National Awards. Nomination criteria for Top Companies included growth, export and trade orientation, contribution to Empowerment and transformation, contribution to job creation and the economy, and overall quality of companies also had to meet the publication's benchmark annual turnover entry criterion (Fletcher, 2005:19).

Examples of these companies are:

- Coal mining
- Diamond mining
- Metals and minerals mining
- Oil and gas
- Chemicals - commodity
- Beverages - brewers
- Health maintenance organisations
- Pharmaceuticals

- Business support services
- Rail, road and freight
- Shipping and ports
- Telecommunication services
- Utilities
- Financials
- Information technology

To extend the sampling size the snowball sampling was used where a few individuals from the relevant population were approached to act as informants and identify other members from the primary, secondary or tertiary sector in the broad base industries in South Africa. The list of companies to which the questionnaire was sent can be found in **Appendix B**.

4.6 Descriptive Statistics

In statistical terms to analyze the data we received from the participant that partook in the survey, we will use elements of descriptive statistics such:

- measure of an average value;
- measure of variability around this average;
- coefficient of variation;
- normal probability distribution
- confidence interval calculation;
- goodness-of-fit test; and
- chi-squares test

Mean: If we denote **x** as the individual numbers - the items of data - and **n** as the number of data items, then the arithmetic mean calculation becomes (Wisniewski, 2002:92):

$$\text{Mean} = \frac{\Sigma x}{n}$$

where Σx refers to the summation of all the **x** values. The arithmetic mean is not necessarily a representative indication of an average for a set of data. There are other measures of average that can be calculated for the same set of data. One of these is

the *median*. The median is a measure of average representing the middle value of a set of data which has been ordered (ranked from lowest value through to highest). Frequently the median will differ in value from the mean and this difference may tell us something about the variability within the data.

Standard deviation: A far more important and more widely used measure of variability is the *standard deviation*. The formula for calculating the standard deviation is (Wisniewski, 2002:100):

$$SD = \sqrt{\frac{\Sigma(x - \bar{x})^2}{n}}$$

where x refers to the individual data items, $\bar{x}$ is the mean and n the number of data items in the data set. The formula is simply the square root of the sum of the squared deviations divided by the number of items in the data set. Typically in statistics, calculations which relate to the population are denoted by a character from the Greek alphabet. Thus:

Population mean = μ (pronounced 'mew')

Population standard deviation = σ (pronounced 'sigma')

The equivalent sample statistics are typically denoted with letters from the standard alphabet:

Sample mean $\bar{x}$ (pronounced 'x bar')

Sample standard deviation **s**

In the context of the sample standard deviation it is also important to note that the formula for its calculation is slightly different from that of the population standard deviation:

$$s = \sqrt{\frac{\Sigma(x - \bar{x})^2}{n - 1}}$$

with the divisor in the equation being **n-1**, not **n** (Wisniewski, 2002:101).

Coefficient of variation: When comparing different sets of data it can be helpful to assess their comparative relative variability rather than the absolute variability measured by standard deviation. This can be done through the statistic known as the *coefficient of variation*. The coefficient of variation is a simple statistic using the mean and standard deviation (Wisniewski, 2002:102):

$$CV = \frac{\text{Standard deviation}}{\text{Mean}} \times 100$$

Normal probability distribution: If we have taken all possible samples from the population and for each sample calculated its mean the distribution of all these means will be Normal. This distribution is known as sampling distribution. In fact this is what the Central Limit Theorem concludes (Wisniewski, 2002:198): "If we take random sample of size n from a population, the distribution of sample means will approach that of the Normal probability distribution. This approximation will become closer, the larger is n".

This is a very important conclusion and underpins much of statistical inferences. The larger the sample size we use, the closer approximation will become. The sampling distribution will approximate to the Normal distribution as long as we take sufficiently large samples. 'Sufficiently large' is generally accepted to be a sample size of at least 30 (Wisniewski, 2002:198-199). The standard deviation of the sampling distribution is given by:

$$\frac{\delta}{\sqrt{n}}$$

where **δ** is the population standard deviation and **n** the sample size. In practice, because δ is generally unknown then we can approximate the standard deviation with:

$$\frac{s}{\sqrt{n}}$$

where s is the standard deviation of sample. So, we are able to describe the sampling distribution in terms of its mean, μ, and its standard deviation $\frac{s}{\sqrt{n}}$.

Confidence interval: The confidence interval represents the probability that a sample mean will fall within the central part of the sampling distribution. The 95% confidence interval calculation is given by Wisniewski (2002:202):

$$95\%\ \text{CI} = \pm 1.96 \frac{s}{\sqrt{n}}$$

X^2 **Tests:** The test we shall use in evaluating data for the pilot study is known as the χ^2 test - also known as Chi-squared test. This is an example of something known as a non-parametric test. The chi-squared statistics plays an important role when we obtain information by counting, rather than measuring. There are frequently times, when we are interested not in a specific parameter of a data set - such as the mean - but on the

whole set of data. However, since we are dealing with a sample set of data we must somehow try to take sampling variation into account. To perform such a test we use something known as the χ^2 distribution (Wisniewski, 2002:225):

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

where O is observed frequency and E the expected frequencies. The chi-squared distribution is different from the normal distribution and has the following characteristics (Bernstain, Foxcroft, McCallum, Schultheiss, Seymour & Stead, 2005:211):

- It can only take on non-negative values;
- It is not symmetrical – it is distribution that is skew to the right;
- It has a different shape depending on the size of sample; and
- The larger the sample size is the more symmetric and less skew the distribution.

As with the other tests, we have a simple decision rule. If the calculated χ^2 obtained from the sample data using the above formula is greater than the critical χ^2 (obtained from the table) we must reject the null hypothesis. One good thing about a χ^2 test is that the null hypothesis is always the same: that there is no significant difference between the observed frequencies and the expected.

Cronbach's alpha coefficient: Cronbach's alpha is a popular method to measure reliability, e.g. in quantifying the reliability of a score to summarize the information of several items in questionnaires. The alpha coefficient is known to be non-robust. Cronbach's alpha estimates the consistency between items in a test, which is the internal consistency of the test. It is defined as

$$\alpha^C = \frac{p}{p-1} \frac{Var(\sum_{j=1}^{p} Y_j) - \sum_{j=1}^{p} Var(Y_j)}{Var(\sum_{j=1}^{p} Y_j)}$$

$$= \frac{p}{p-1} \frac{\sum\sum_{j \neq k} \sigma_{jk}}{\sum\sum_{j,k} \sigma_{jk}}$$

Where σ_{jk} is the covariance of the pair (Yj, Yk). The values 0.7 or 0.75 are often used as cut-off value for Cronbach's alpha and thus for the reliability of the test (Christmann& Van Aelst, 2006:1661)

The calculation of the Cronbach's alpha for information management best practices is given in **Appendix E**. The correlations were based only on cases of data which were pair-wise complete. The table with correlation with the total score of the particular set of questions gives an indicator whether all question are consistent with the overall construct formed by the section. Low or negative correlations hamper the reliability and the table also gives the value of alpha without a particular question.

4.7 Development of the analysis model

The analysis model was developed based on the criteria evaluated using advanced statistical procedures. The five most important components of information management were selected by counting the number of times they were represented in the respondents' feedback data. The next step was to select the best practices associated with most important information management components using the highest feedback score from five-point Likert-type questions. The radar type of graphical presentation was used to show the differences between the experiences of respondents' towards information management best practices in the workplace and how they perceived the best practices.

4.8 Summary

This chapter is a summary of the empirical part of the study. This includes the way in which the information was gathered, the size and choice of the population group, the evaluation of the information and the processing and testing of the analysis model. The problem experienced within this part of the study was to obtain feedback data from the questionnaires sent to the respondents. A very important limitation of the study is that it is only evaluating perceptions of information management best practices by the respondents from South African companies. To date, limited literature regarding this subject exists in South Africa.

CHAPTER 5: INTERPRETATION OF RESULTS OBTAINED FROM THE EMPIRICAL STUDY

"Computing has been pervasive in business for no more than 20 years or so, and the great advances in technology have not yet been fully matched by advances in skills for managing organisations in which technology is pervasive".

- Sebastian Nokes

5.1 Introduction

The objectives of the previous chapters were primarily targeted at a literature study of Information Management (IM). More specifically, chapter two focused on the role of information management in an organisation. Chapter three focused on the more in-depth discussion of information management principles and best practices in broad base industries. Chapter four explained how the most important quantitative criteria were determined and how the step by step model was developed to evaluate these criteria. This chapter presents the results of the empirical study. A pilot study in the development of the questionnaire was conducted to test the questionnaire empirically. To investigate the validity of the data a standard error of the sampling distribution was calculated. The data was analysed using descriptive statistics as well as inferring possible trends or conclusions based on relationships between certain responses on specific related questions and referring to the literature study of Chapter 2 and Chapter 3. The five most important components of information management were found after calculating the five highest scores from the respondents' data. The best practices for five most important components of information management were also found. After analysing the data, the variables identified within the model were summarized in a matrix format. Radar Graph was used to illustrate identification of the model criteria. The proposed framework was tested and validated.

5.2 Pilot study in the development of questionnaire

A pilot study in the development of the questionnaire was conducted to test the questionnaire empirically. It is virtually mandatory to test survey questionnaires on a small group of individuals who are representative of the populations for which they are

intended. Random samples of 30 respondents employed in the broad base industries have completed the questionnaire. The pilot study would indicate whether they do not understand the questionnaire's instructions, the meaning of the questions, and the meaning of any words in the questionnaire. The purpose of the pilot study on a limited number of data from the same population was:

- To detect possible flaws in the measurement procedures (such as ambiguous instructions, selections and ranking, and so on;
- To identify unclear or ambiguously formulated items.

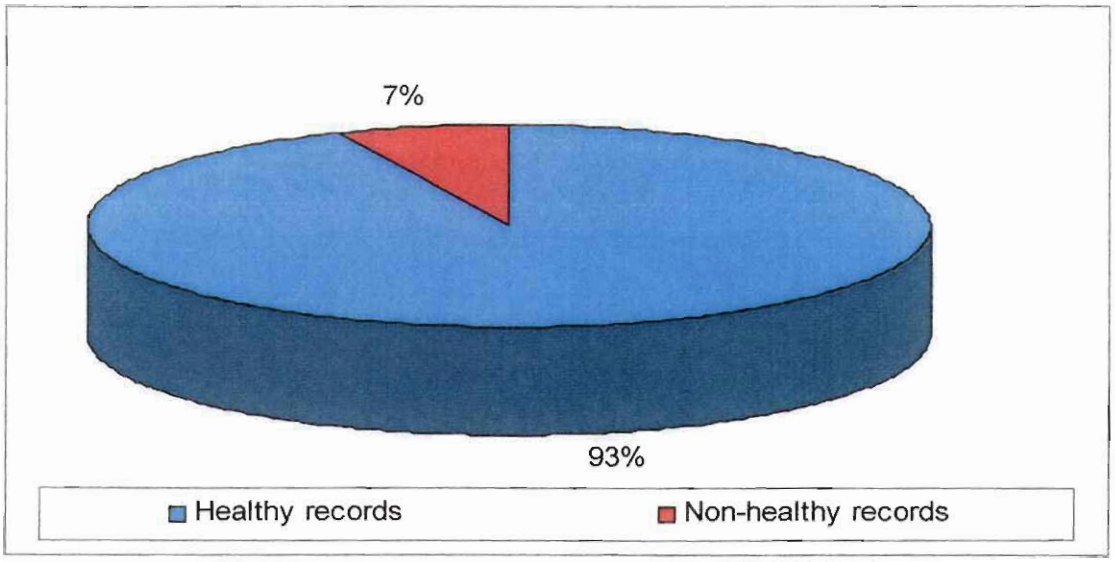
For the pilot study a composite listing of the names and addresses of the potential respondents was compiled. Confidentiality of responses was guaranteed by the author. A data set was designed to host raw data from survey responses and the MoonStats statistical software program was used to perform the standard descriptive statistical computations. Questions within the research questionnaire were analyzed using descriptive and inferential techniques. In order to accomplish this objective, respondents were requested to select five most important components of information management from the provided list and rank them according to the importance to their industry. The next step was to rate the information management best practices for selected information management components. Frequency and mean distributions were utilized to analyse the data. MoonStats statistical software program provides the statistical tools for data exploration and data description (MoonStats, 2006). The **Table 5.1** below gives a summary of data records.

Table 5.1: Records for pilot testing

Records	Number of occurrences	Percentage (%)
Healthy records	28	93.33%
Non-healthy records	2	6.67%
TOTAL	30	100.00%

Graph 5.1 on page 91, graphically shows the distribution of records according to their status of healthiness. The graph indicates the percentage of healthy and non-healthy records received from respondents.

Graph 5.1: Distribution of records according to their status of healthiness



The pilot study showed the following:

- There were 28 healthy records out of 30;
- There were only two records that were "non-healthy" and have been discarded. One person indicated that he is not qualified to answer such a questionnaire. The second person selected more than 5 components in part 2 of the questionnaire;
- There were three records that contained two items with the same scoring in part 2 of the questionnaire. The participants were requested to select from the list the five most important components of Information Management (IM) and rank them from 1 to 5 (1 – lowest ranking; and 5 – highest ranking). The records were considered as healthy as the participants did select only 5 components and provision were made that participant could theoretically rate two components with the same score.
- There was one record where the participant didn't disclose the name of his/her company (part 4 of questionnaire) but did indicate the type of industry. The record was used as a healthy record.
- Two participants didn't state their positions within the organisation. These records were considered as healthy as the participant did provide the name of organisation and type of industry. This helped to identify whether the participant belonged to the business, finance or IM/IT group.

An Internet survey form was developed to make response easy for the participants. The form could be modified to address minor issues listed above. For instance, participants

could be forced to supply all details requested in the questionnaire, otherwise he or she wouldn't be able to proceed with the submission of response data. This process would definitely decrease the number of participants as they wouldn't be able to finish the survey and the sample size would be smaller. The researcher has decided not to modify the questionnaire as there were enough "auxiliary "questions that helped to clarify healthiness of the records.

Confidence Interval (CI): To investigate the validity of the data a standard error of the sampling distribution was calculated using an appropriate formula (Wisniewski, 2002:204):

$$\text{SE of percentage} = \sqrt{\frac{p(100-p)}{n}}$$

where p is the sample percentage. The formula for the confidence interval can be given as:

$$\text{CI} = p \pm Z_{\alpha/2}\sqrt{\frac{p(100-p)}{n}}$$

$$95\%\ \text{CI} = 93.33 \pm 0.98\sqrt{\frac{93.33(100-93.33)}{30}}$$

$$95\%\ \text{CI} = 93.33 \pm 4.46$$

The 95 per cent CI indicates that there is a 95 per cent probability that the sample percentage and the population percentage of healthy records are no further apart than 4.46 percentage points.

5.3 The results from the statistical analysis

The questionnaires were sent out to various people within the broad base industries. This included: IM/IT managers and specialists; chief financial officers (CFOs) and financial specialists; and chief executive officers (CEOs), operations managers, maintenance managers, plant managers, marketing managers and other personnel from business units that can benefit from information management. A composite listing of the names and addresses of the potential respondents was compiled using the info from the book 'Top 300 national companies'. The book had e-mail addresses and

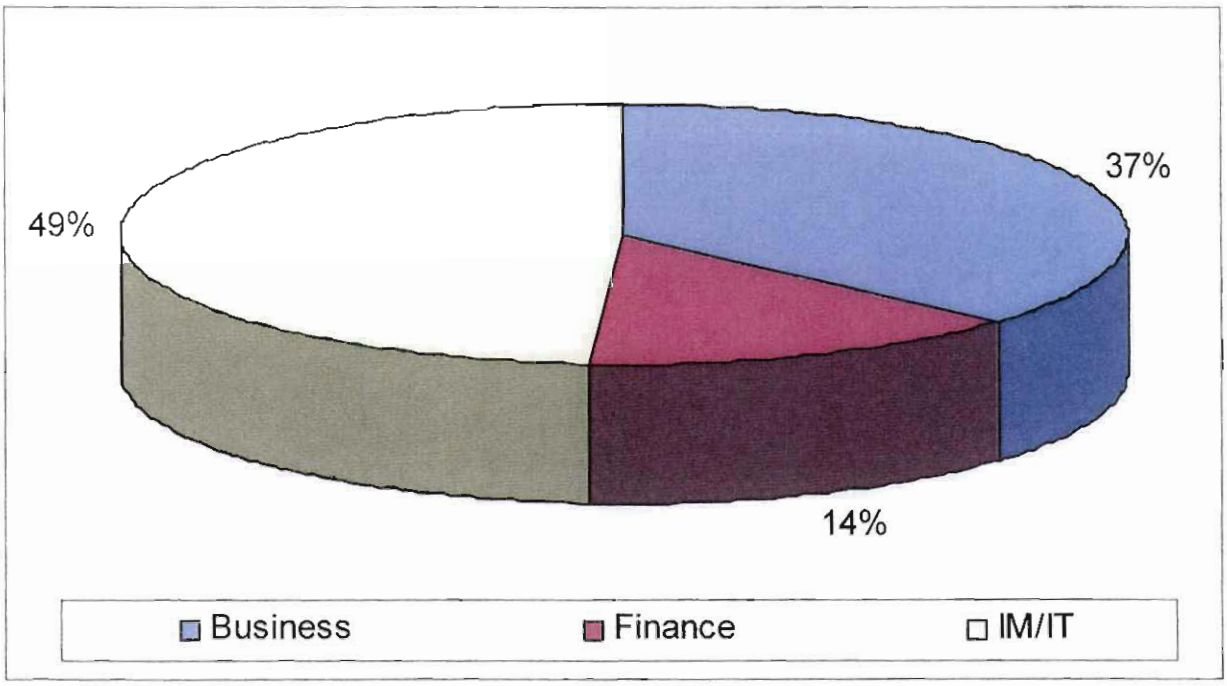
telephone numbers for general inquiries. There was no information for the personnel that were mentioned in the book like the Chief Executive Officer (CEO), Managing Director (MD), IT manager or any other position. The researcher sent a number of questionnaires to those general e-mail addresses asking that e-mail would be forwarded to the relevant person within the organisation. This effort didn't bear any significant result. An additional effort was made by the researcher to contact companies and ask them to disclose the info (e-mail or telephone number) of a participant that could contribute to the survey. On identification of the correct people, the questionnaires were sent to them directly asking them to partake in the survey about information management best practices.

An effort was also made to target people with different skill sets and backgrounds from the business, financial and IM/IT sector to ensure a balanced view on the perceptions of information management best practices by the respondents from South African companies. Of the 111 questionnaires sent out, 51 responses were received where 49 were "healthy" responses and were used for the analysis, as two responses contained partial information and were deemed as rejects.

The responses received populated into an Excel Spreadsheet to make data analysis easier. **Appendix D** contains the raw data as captured using Excel. For easier manipulation, the responses for Part 1 and Part 4 of questionnaire were given numerical values so that standard Excel formulae could be applied. Part 2 and Part 3 of questionnaire would by default have a numerical response value.

The data was analysed using descriptive statistics as well as inferring possible trends or conclusions based on relationships between certain responses on specific related questions and referring to the literature study of Chapter 2 and Chapter 3. The results indicate that most of the respondents were from organisations nominated as Top 300 National Companies for 2004/05. All the companies surveyed have achievements in business in terms of leadership, company growth, innovation, contribution to the economy, job creation and transformation. The respondents were spread across three types of job categories: business, finance and IM/IT. This was intentional as the aim was also to determine if different people within the organisation view information management as a discipline differently. The distribution is shown in **Graph 5.2.**

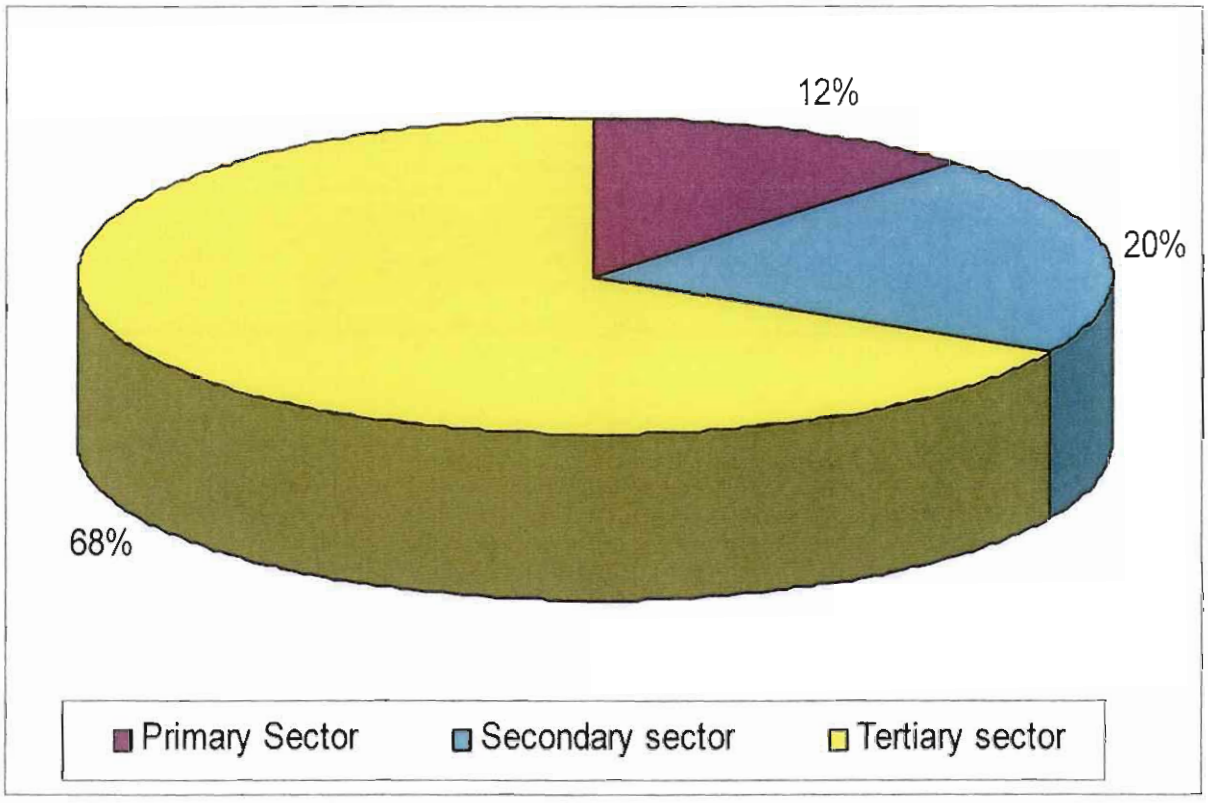
Graph 5.2: Distribution of records according to respondents' role within the organisation



The highest percentage, namely 49% of the respondents that replied was from the IM/IT category including IM and IT managers and specialists. Thereafter the highest response was from business category including chief executive officers (CEOs), operations managers, maintenance managers, plant managers, marketing managers and other personnel from business units of 37%. This was followed by the response from financial category including chief financial officers (CFOs) and financial specialists of 14%.

Regarding the industry type, the highest percentage of respondents that replied was from the industry tertiary sector 68%, followed by secondary sector 20% and finally by primary sector 12%. The distribution of records according to respondents' industry type is shown in **Graph 5.3** on page 95.

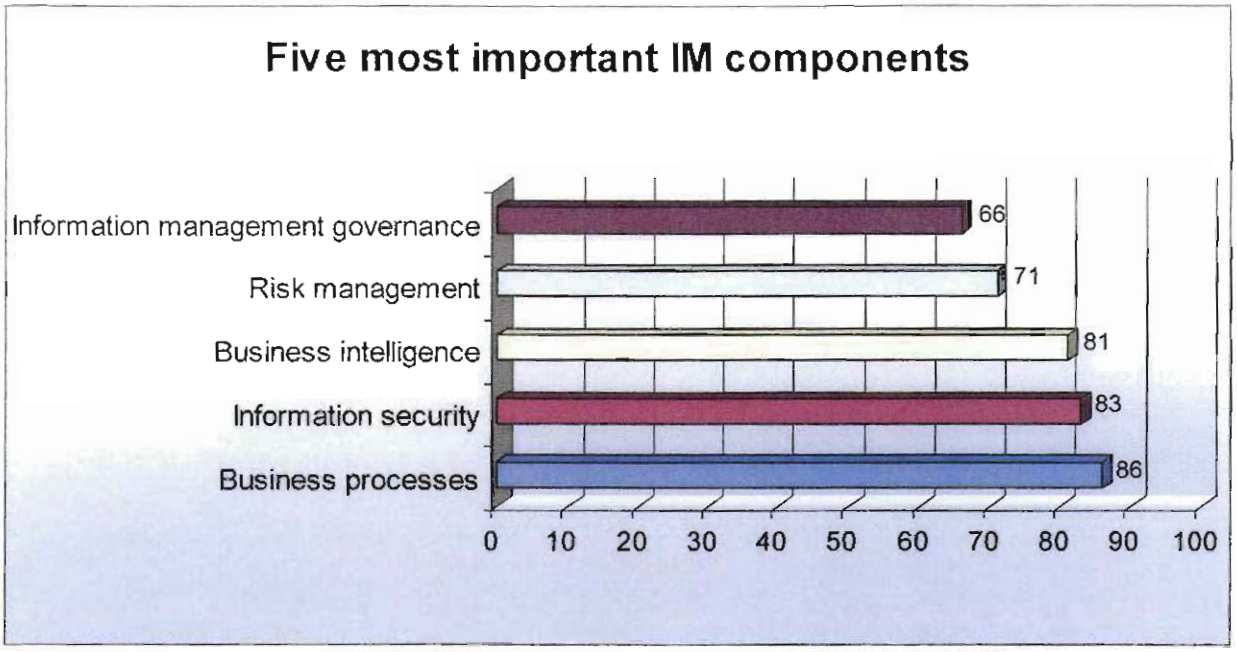
Graph 5.3: Distribution of records according to respondents' industry type



The questions were formulated according to a model established during the literature study, and a Likert-type 5-point scale as a measure of attitudes or perceptions were used. In respect of each question, respondents had to indicate the degree to which they agreed or disagreed with its content. The elements of descriptive statistics were used to determine the value of respondents' positive attitude towards the information management best practices. The results of descriptive statistical tests (Mean, StdDev and Min/Max) can be found in **Appendix E.** Frequency tabulation of the scores is given in **Appendix F**. The five most important components of information management were found after calculating the five highest scores from the respondents' data.

Graph 5.4 on page 96 indicates the most important information management components as they were seen by personnel in broad base industries in South Africa.

Graph 5.4: Five most important IM components



The best practices for the five most important components of information management were also found after calculating the highest scores for each best practice from the respondents' data. **Table 5.2** below gives a summary of these best practices.

Table 5.2: Summary of best practices

IM COMPONENT	BEST PRACTICES
Business Processes	Document business processes
	Standardise on software for capturing business processes
	Change control for business processes in place
	Build generic solution for business processes
Information Security	Virus control implemented
	System access control implemented
	Personnel security in place
	Security policy in place
	Data security controls for data files
Business Intelligence	Support and training in place
	Appropriate tools for querying and analyzing data, including visualisation, communication, Online Application Processing (OLAP), etc
	Partnering with experienced consulting groups or vendors

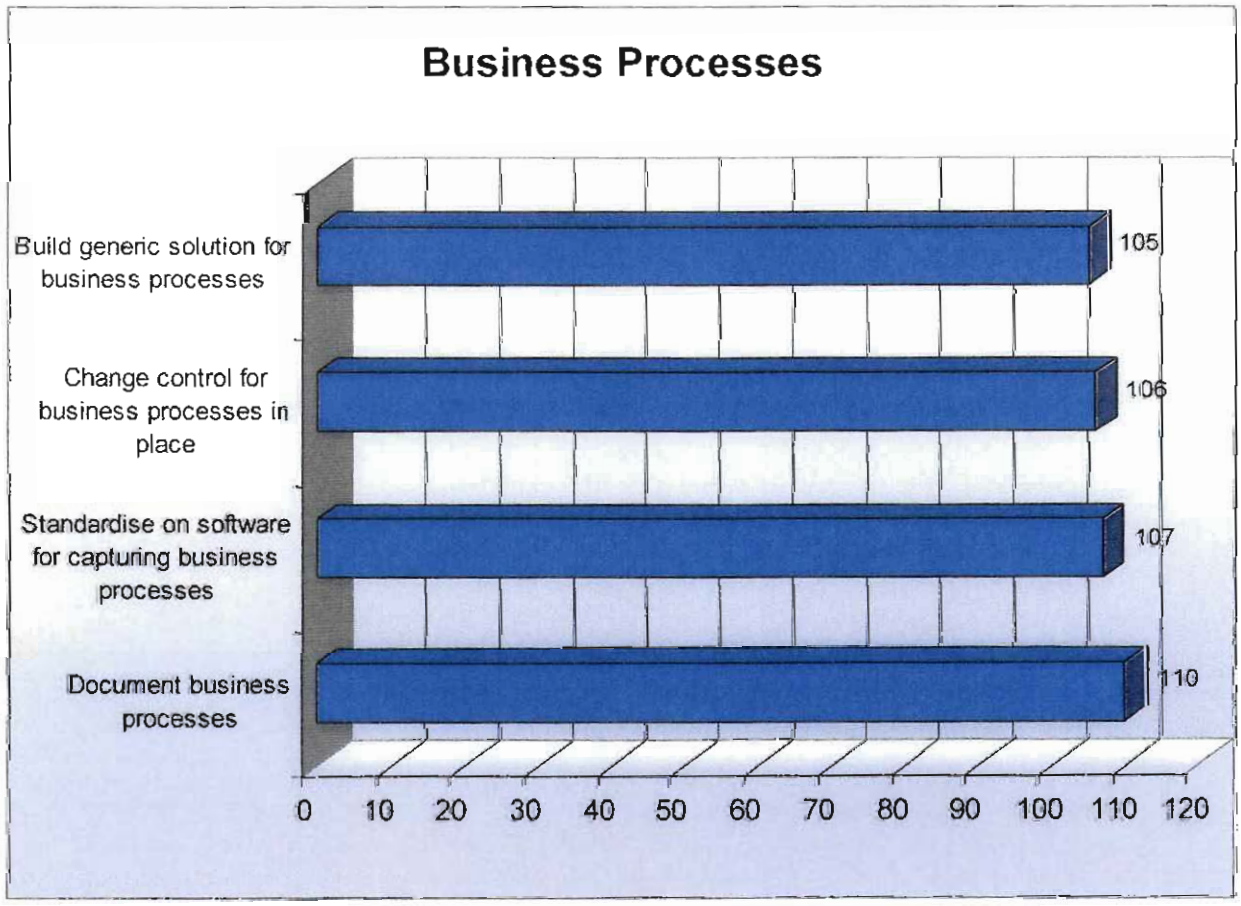
Table continues on page 97.

Table continues from page 96.

Risk Management	Risk management framework implemented
	Risk management is a part of business plan
	Risk management plan in place
	Applied risk analysis
	Written business plan
Information Management Governance	Information management strategy aligned with business goals
	Information management projects on schedule and within budget
	Risks are defined and understood
	Senior management understand information management governance
	High value from information management investments

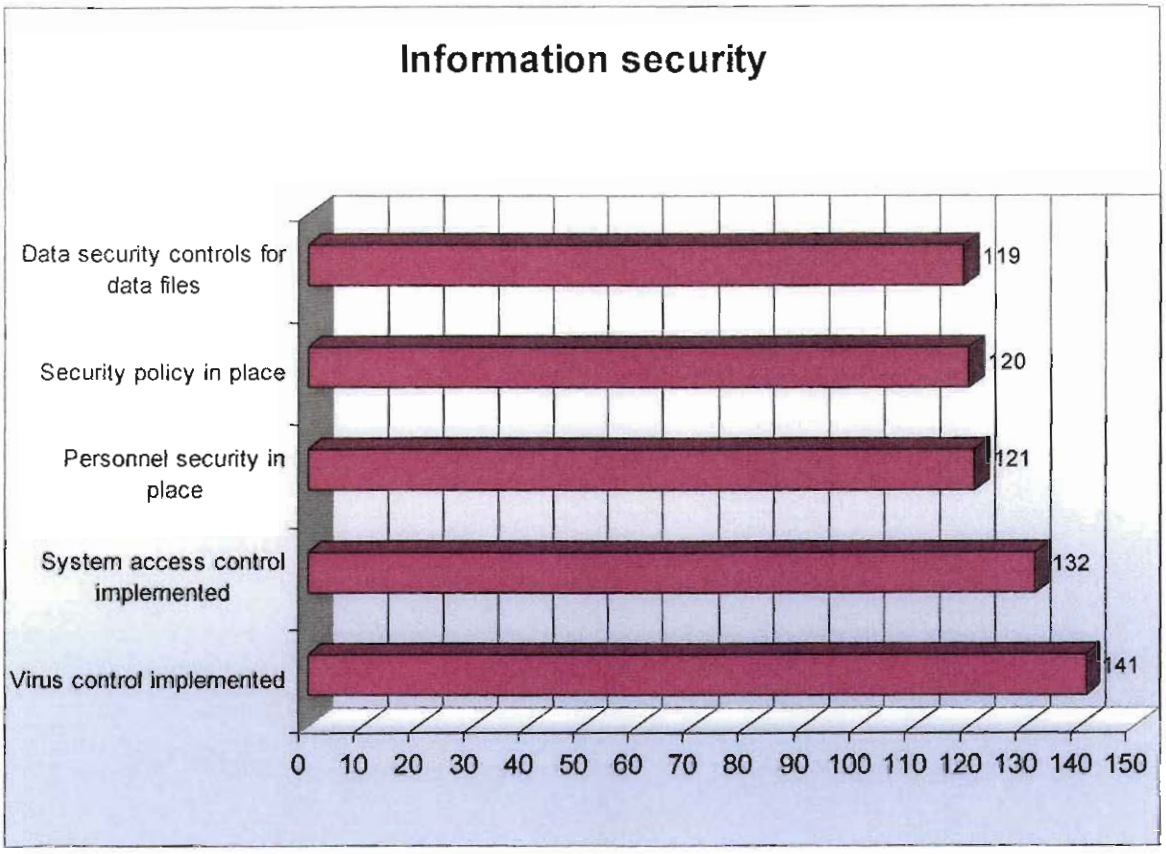
Graphs 5.5, 5.6, 5.7, 5.8 and 5.9 indicate the perception of information management best practices in broad base industries in South Africa.

Graph 5.5: Business processes - best practices

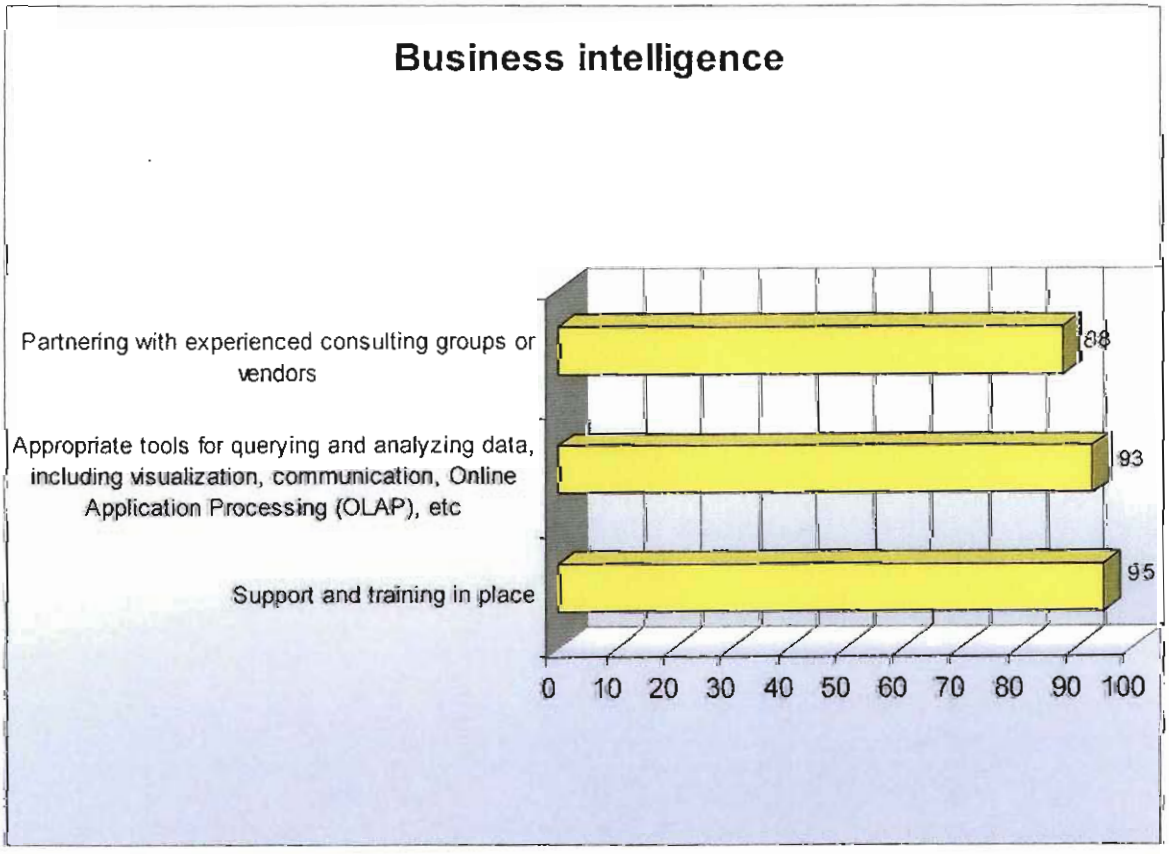


The same way the other graphs are presented.

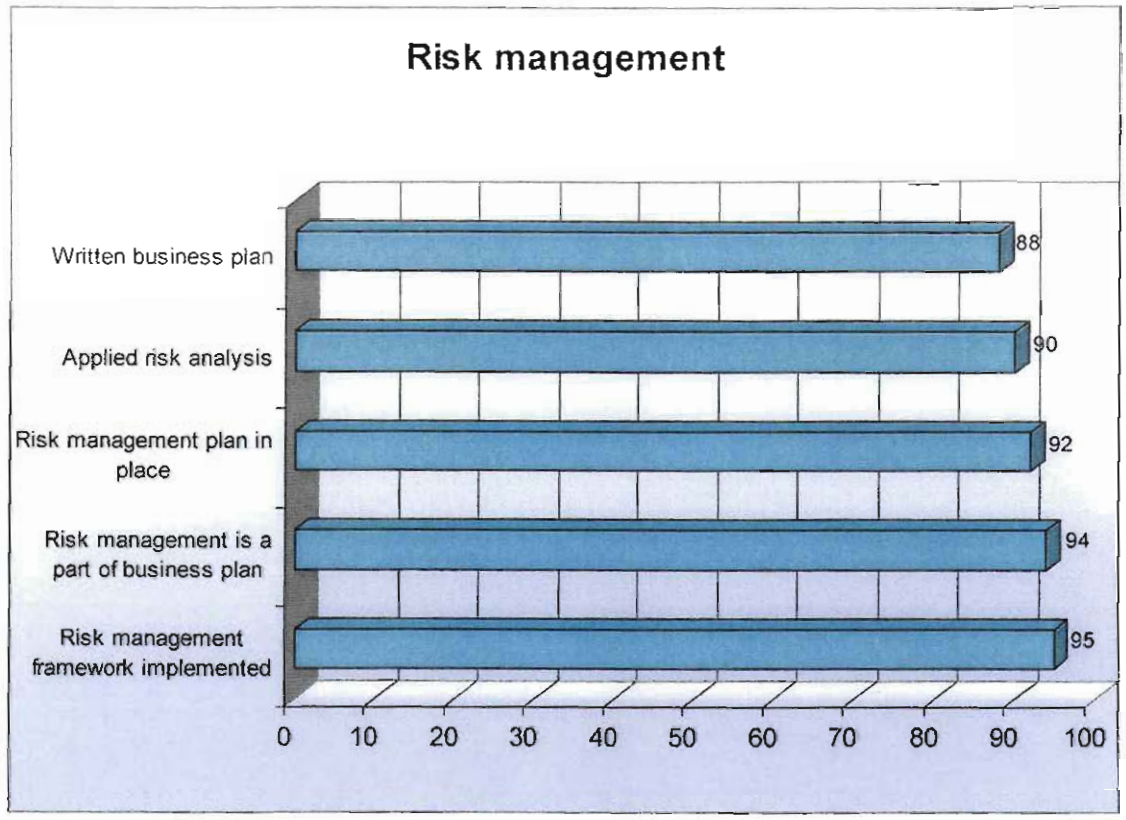
Graph 5.6: Information security - best practices



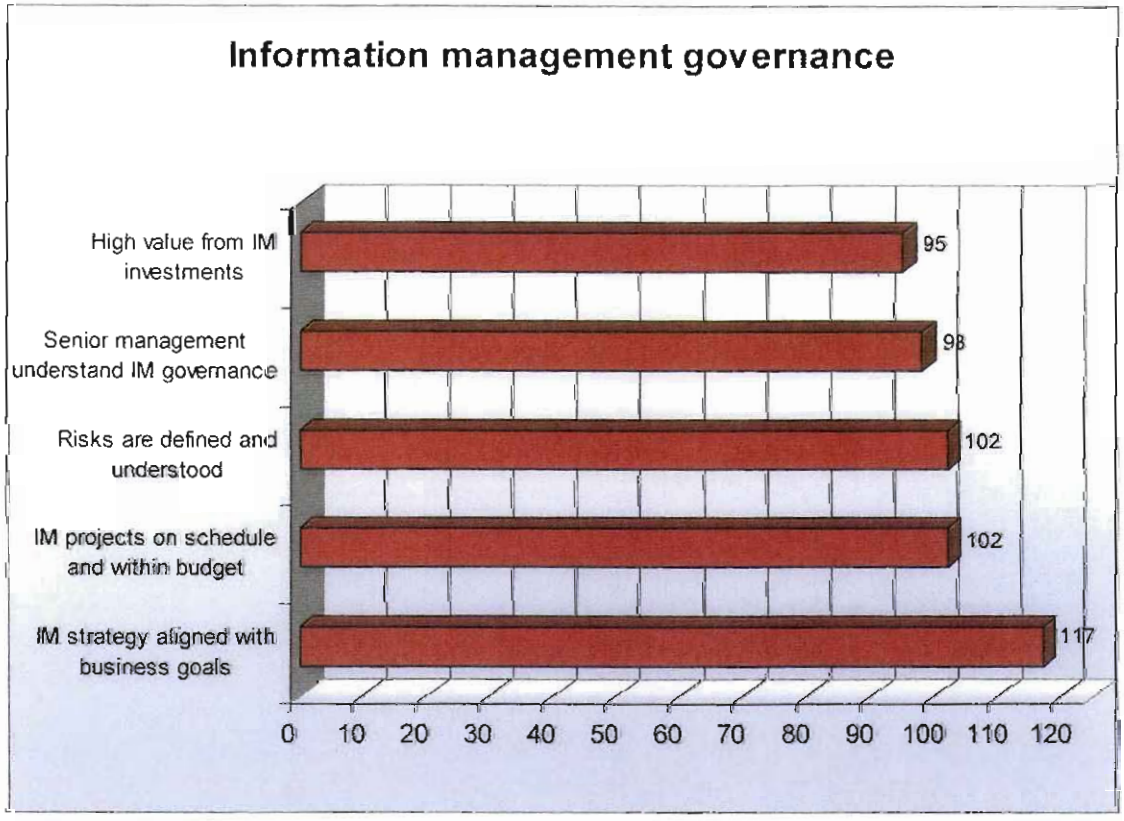
Graph 5.7: Business intelligence - best practices



Graph 5.8: Risk management - best practices



Graph 5.9: Information management governance - best practices



It is also important to notice that not all participants were aware of some best practices. **Table 5.3** below shows the summary of such findings.

Table 5.3: Best practices not known to industry

Best Practice	No. of participants that didn't know about best practice
Use of BS7799 standard	11
Implemented COBIT framework	9
Use of ISO 17799 standard	7
Use of structured project management method PRINCE2	6
Implementation of ITIL framework	3
Risk controls are mapped to regulations such as Sarbanes–Oxley	2
Assets classification procedure and control defined and implemented	2
Defined control of proprietary copying	2
Outsourcing contract between 3 to 5 years	1
Outsourcing contract more than 5 years	1
Information management governances don't change frequently	1
Use of global IT-related standards:	1
Established Projects Management Office (PMO)	1
Limit the size of the project teams (small teams have less communication problems)	1
Treat each problem as unique	1
Focus on the purpose of problem-solving	1
Computer operations controls in place for computer operations	1
Business contingency plan in place	1

There were also a few suggestions from respondents of new best practices:

- Innovation around Business Process to differentiate
- Use of Structured Project Management
- Flexible IT Infrastructure
- Integration and standardisation
- Use of COSA standards (Records storage standards)

5.4 Development of a model to assess information management in broad base industries

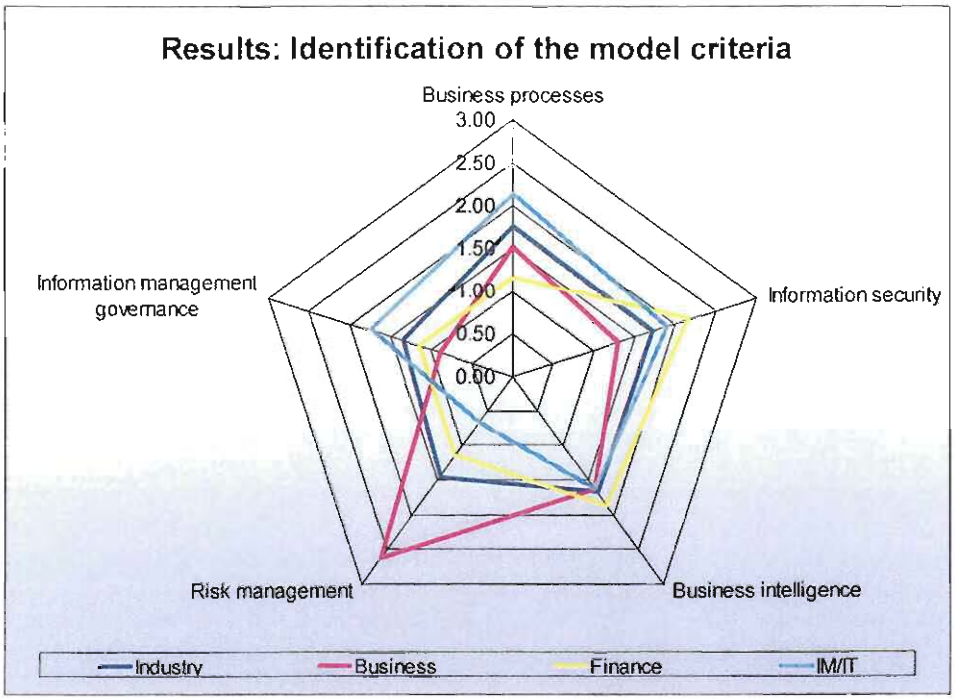
After analysing the data, the variables identified within the model were summarized in a matrix format. The following table, **Table 5.4**, indicates the results of this analysis. It shows the average rating for five information management components by IM/IT, finance and business segments and the industry as whole.

Table 5.4: Summary results of the analysis

	Industry	Business	Finance	IM/IT
Business processes	1.76	1.50	1.14	2.13
Information security	1.69	1.28	2.14	1.88
Business intelligence	1.65	1.61	1.86	1.63
Risk management	1.45	2.61	1.14	0.67
Information management governance	1.35	0.89	1.14	1.75

The radar graph, **Graph 5.10**, indicates these results clearly. The most uniform perception was identified for the information management component 'Business Intelligence'. On average it was rated almost equally by all participants. On the other hand there is a significant difference in perception from all industry segments and the whole industry for 'Risk Management'.

Graph 5.10: Identification of the model criteria



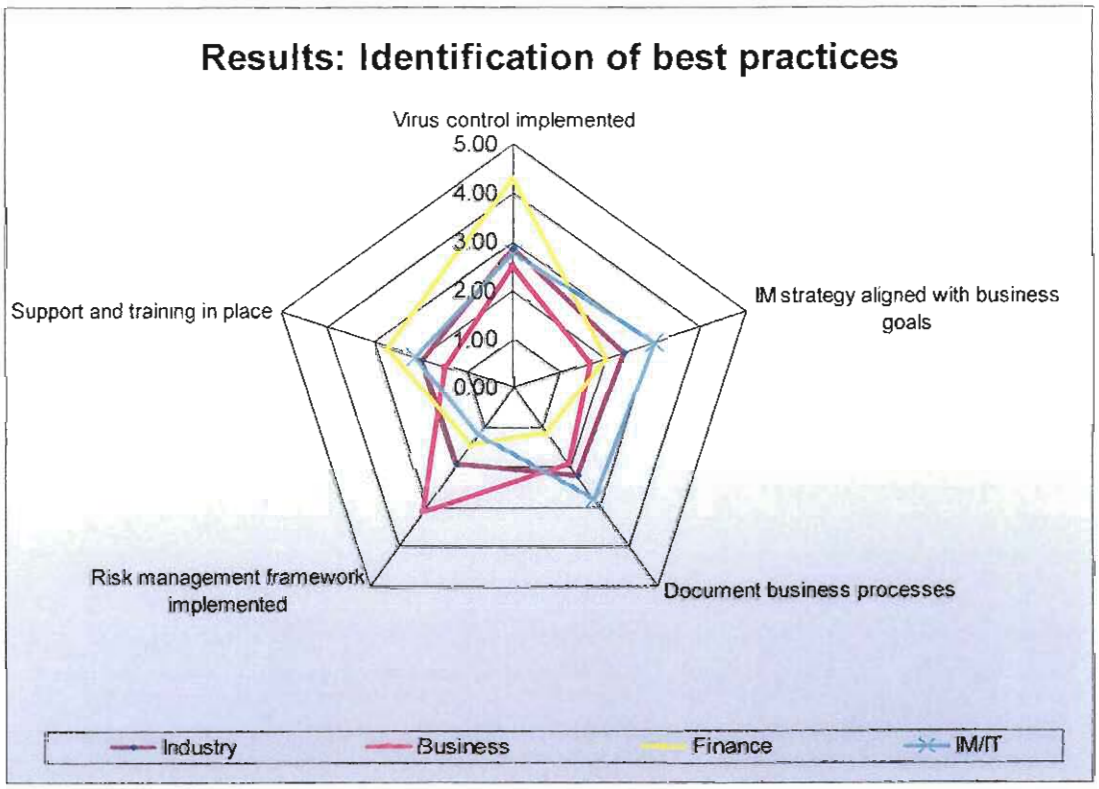
The similar step was done for the best practices associated with the most important information management components. **Table 5.5** below shows a matrix format for best practices.

Table 5.5: Summary results of the analysis for best practices

	Industry	Business	Finance	IM/IT
Virus control implemented	2.88	2.50	4.29	2.75
Information management strategy aligned with business goals	2.39	1.67	2.00	3.04
Document business processes	2.24	1.94	1.14	2.79
Risk management framework implemented	1.94	3.11	1.43	1.21
Support and training in place	1.94	1.44	2.71	2.08

The radar graph, **Graph 5.11**, indicates the results for best practices. There is a significant difference in perception from all industry segments and the whole industry for all identified best practices.

Graph 5.11: Identification of best practices



5.5 Testing of the model developed

For testing of the model it was decided to select three companies from broad base industries, from the primary, secondary and tertiary sector. For the research purpose they are called **Company 1**, **Company 2** and **Company 3** respectively. The minimum criteria were:

- to have two to three participants from the same company that responded to the research questionnaire; and
- participants from the same company should have different skill sets and backgrounds.

Company 1: It was formed more than 50 years ago. It has a workforce of more than 5000 employees. It is a global player in chemicals. It has interests in oil and gas exploration and production.

Company 2: An integrated minerals and metals company focusing on a range of steel products, iron ore, coal and selected industrial minerals and metals. It has a workforce of more than 5000 employees.

Company 3: A large South African IT company.

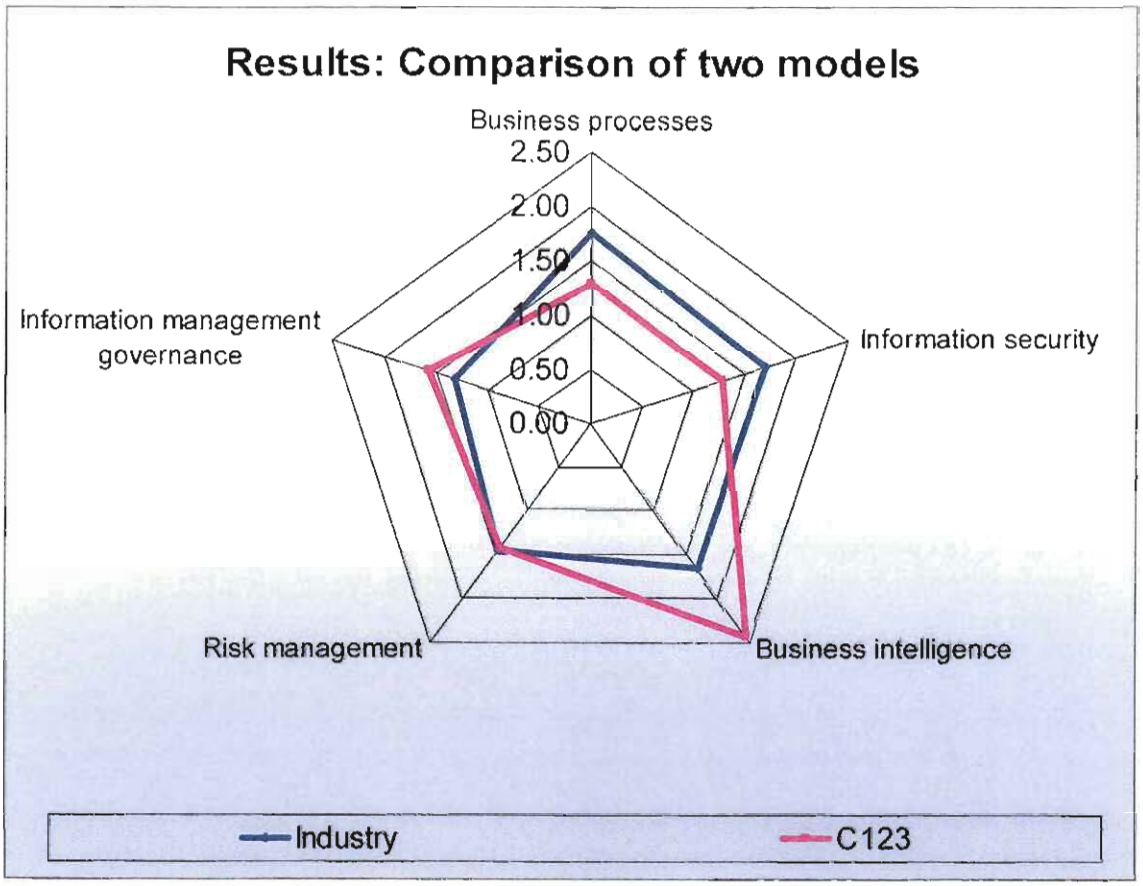
The data from **Company 1**, **Company 2** and **Company 3** was analysed and thereafter summarized in a matrix format. **Table 5.6** below indicates the results of this analysis. It shows the average rating for the selected three companies (column C123) and the industry as whole.

Table 5.6: Summary results of the test analysis

	Industry	C123
Business processes	1.76	1.29
Information security	1.69	1.29
Business intelligence	1.65	2.43
Risk management	1.45	1.43
Information management governance	1.35	1.57

The radar graph, **Graph 5.12** on page 104, indicates the results of the test analysis. There is a reasonable similar result for four components for two models. The only significant difference was seen for one component (Business Intelligence).

Graph 5.12: Comparison of two models



Based on the analysis presented above, the framework that was tested is valid.

5.6 Summary

In this chapter the results of the empirical study were discussed and the most important quantitative criteria were identified. The highest percentage of respondents that responded to the questionnaire was from the industry tertiary sector 68%. The results of the model testing indicated that the most uniform perception was identified for the information management component Risk management. The best practices for the five most important components of information management were also found for broad base industries after calculating the highest scores for each best practice from the respondents' data. Not all participants were aware of some information management best practices. The results of the empirical study also showed that there is a significant difference in perception from all industry segments and the whole industry for all identified information management best practices.

CHAPTER 6: GENERAL CONCLUSION AND RECOMMENDATIONS FOR FURTHER STUDY

"Knowledge has become the key economic resource and the dominant and perhaps even the only source of competitive advantage".

- Peter Drucker

6.1 General conclusion

The main objective of this study was to evaluate theory and investigate the perception of Information Management (IM) best practices in broad base industries. The background of the study was set in chapter two through a comprehensive study of information management. Within this section, the role of information management in an organisation was discussed as a foundation for the more in-depth discussion on information management best practices in broad base industries. Although this section discussed information management in general, more emphasis was placed on the role of information in the decision-making process. In chapter three the numbers of information management components were identified as a foundation for the more in-depth discussion on information management principles and best practices in broad base industries. It was found that authors place high priority on the following information management components:

- Information security
- Information management governance
- IT standardisation
- Regulatory requirements for information management
- Business intelligence
- Virtual collaboration
- Management of service outsourcing
- Selection of service providers
- Project management
- Change management
- Risk management
- Asset management
- Knowledge management

- Business processes
- Balanced scorecard
- Benchmarking
- Competitive Intelligence
- Business partnering

The empirical study was discussed in chapter four. It was conducted in six phases. The first phase consisted of establishing a framework of information management best practices in broad base industries and the second phase was to develop a preliminary measuring instrument to investigate the perceptions of the sampling population on information management best practices. Phase three consisted of a pilot study in the development of a questionnaire. Phase four was to investigate perceptions of information management best practices in broad base industries. The analysis model was developed based on the criteria evaluated using advanced statistical procedures. Phase five was to describe the results of the empirical study for information management best practices in broad base industries. Phase six was to compare the perception what the information management best practices are as perceived by companies from broad base industries.

In the empirical study the information management components were evaluated and the five most important components were identified. The five most important information management components were:

- Business processes
- Information security
- Business intelligence
- Risk management
- Information management governance

The best practices for five most important components of information management were also found after calculating the highest scores for each best practice from the respondents' data. The summary of best practices for each most important information management component is given below:

- Business Processes
    - Document business processes
    - Standardise on software for capturing business processes

    - Change control for business processes in place
    - Build generic solution for business processes
- Information Security
    - Virus control implemented
    - System access control implemented
    - Personnel security in place
    - Security policy in place
    - Data security controls for data files
- Business Intelligence
    - Support and training in place
    - Appropriate tools for querying and analyzing data, including visualisation, communication, Online Application Processing (OLAP), etc
    - Partnering with experienced consulting groups or vendors
- Risk Management
    - Risk management framework implemented
    - Risk management is a part of business plan
    - Risk management plan in place
    - Applied risk analysis
    - Written business plan
- Information Management Governance
    - Information management strategy aligned with business goals
    - Information management projects on schedule and within budget
    - Risks are defined and understood
    - Senior management understand Information management governance
    - High value from Information management investments

The five highest ranking best practices were:

- Virus control implemented;
- Information management strategy aligned with business goals;
- Documented business processes;
- Risk management framework implemented; and
- Support and training in place.

Not all participants were aware of some information management best practices. The data analysis showed that 22.45% of participants that took part in survey haven't heard of the information security BS7799 standard; 18.37% didn't know about the COBIT framework; 14.29% didn't know of the ISO 17799 Code of Practice for Information Security Management; and 12.24% haven't heard of the structured project management method PRINCE2.

Three companies from broad base industries from different industry sectors were selected and the model was tested. The results indicated that there is a reasonable similar result for four components for two models (industry as whole versus three companies). Only significant difference was seen for one component (Business Intelligence).

The results of the empirical study also showed that there is a significant difference in perception from all industry segments and the whole industry for all identified information management best practices. The model developed can therefore be used within the South African context to evaluate a company's perceptions on information management best practices.

6.2 The contribution of this research and its limitations

This study advances our knowledge of the importance of information management in broad base industries, the technologies employed, the value of information, the risks involved with information management investments and how these risks can be managed. The researcher hopes that this study encourages further research that will help to unravel the nature of the complex relationship between information management and organisational performance.

A very important limitation of the study is that it is only evaluating perceptions of information management best practices by the respondents from South African companies. To date, limited literature regarding this subject exists in South Africa.

6.3 Recommendation for further study

Flowing from this study there are a number of research fields that require more detailed analysis namely:

- Future studies should concentrate on narrowing down to a particular industry sector in broad base industries. In this way, specific models for the primary, secondary and tertiary sector can be created to evaluate perceptions on information management best practices in a particular sector.
- Another study could also concentrate on information management best practices in education and training sectors.
- The research can be extended to government national, provincial and local departments and agencies.
- Further research can be also expanded on change management principles and practices within information management in broad base industries. This research would address the new ways of doing change management to accommodate the frequent changes of information management as a discipline.

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8 APPENDICES

8.1 Appendix A: Questionnaire sent out to investigate the perception of information management best practices in broad base industries

Dear Sir/Madam

Information Management: Best practices in broad base industries

Could you kindly complete the following questionnaire, preferably electronically, and send your responses back to me by using any of the following communication channels:

Email: pejanot0@mweb.co.za
Facsimile: +27 86 689 6122
Postal Address: 1 Town View Flats
Brebner Street
Sasolburg
1947

This questionnaire is part of my mini-dissertation that is required as the final part of my MBA studies at the North-West University. The topic registered with the university is: **Information Management: Best practices in broad base industries.**
Responses are confidential and will only be used for academic purposes.

For more details on my mini-dissertation topic or issues with the questionnaire please contact me on +27 83 630 7559. Alternatively contact my study leader, Mr JC Coetzee on +27 18 299 4012 and/or e-mail: pbsjcc@puk.ac.za

Yours sincerely

Trivko Pejanovic

QUESTIONNAIRE - PART 1

What best describes your current position within the organisation?

	X
A.1 Chief Executive officer (CEO)	
A.2 Chief Financial Officer (CFO)	
A.3 Chief Information Officer (CIO)	
A.4 Other	

QUESTIONNAIRE - PART 2

Please select from the list below the **five most important components** of Information Management (IM) and rank them from 1 to 5. (You may add additional components if you consider them important.)
1 – *Lowest ranking*
5 – *Highest ranking*

IM COMPONENT	SELECTION	RANKING
B.1 Regulatory compliance		
B.2 Management of service outsourcing		
B.3 Selection of service providers		
B.4 Information management governance		
B.5 IT standardisation		
B.6 Project management		
B.7 Change management		
B.8 Risk management		
B.9 Asset management		
B.10 Knowledge management		
B.11 Information security		
B.12 Business processes		
B.13 IM balanced scorecard		
B.14 Benchmarking		
B.15 Business intelligence		
B.16 Virtual collaboration		
B.17 Competitive intelligence		
B.18 Business partnering		
B.19 Other. Please specify.....		

QUESTIONNAIRE - PART 3

Please rate all the elements of "Best Practices" for IM components **selected in PART 2**.

N/A – *Never heard of it.*
1 - *It is of no importance at all.*
2 - *It is probably not important.*
3 - *It is of some importance.*
4 - *It is fairly important.*
5 - *It is very important.*

IM COMPONENT	BEST PRACTICES	RATING
B.1 Regulatory compliance	B.1.1 Security and privacy policy in place	
	B.1.2 Document retention policy in place	
	B.1.3 Financial regulation compliance	
	B.1.4 A full-time compliance officer employed	
	B.1.5 Implementation of COBIT framework	
	B.1.6 IT governance structure in place	
	B.1.7 Implementation of ITIL framework	
	B.1.8 Other. Please specify.	
B.2 Management of service outsourcing	B.2.1 Outsource of customer services to offshore locations	
	B.2.2 Outsource of customer services to inshore locations	
	B.2.3 Pilot testing before signing long-term outsourcing contract	
	B.2.4 Outsourcing contract less than 3 years	
	B.2.5 Outsourcing contract between 3 to 5 years	
	B.2.6 Outsourcing contract more than 5 years	
	B.2.7 Other. Please specify.	
B.3 Selection of service providers	B.3.1 Single supplier	
	B.3.2 Multiple suppliers	
	B.3.3 Technology expertise and experience	
	B.3.4 Resourcing	
	B.3.5 Project management experience	
	B.3.6 Other. Please specify.	
B.4 Information Management governance	B.4.1 High value from IM investments	
	B.4.2 Senior management understand IM governance	
	B.4.3 IM projects on schedule and within budget	
	B.4.4 IM governances don't change frequently	
	B.4.5 IM strategy aligned with business goals	

	B.4.6 Risks are defined and understood	
	B.4.7 Scorecard mechanism has been established	
	B.4.8 IM governance linked to enterprise governance	
	B.4.9 Other. Please specify.	
B.5 IT standardisation	B.5.1 Use of global IT-related standards: • *Internal Control—Integrated Framework, 1994* • *Enterprise Risk Management—Integrated Framework, 2004* • *Information Technology Infrastructure Library (ITIL), 1999-2004* • *ISO/IEC 17799:2005, Code of Practice for Information Security Management* • *SEI Capability Maturity Model (CMM), 1993* • *SEI Capability Maturity Model Integration (CMMI), 2000* • *Project Management Body of Knowledge (PMBOK), 2000* • *The Standard of Good Practice for Information Security, 2003*	
	B.5.2 Implemented COBIT framework	
	B.5.3 Established Projects Management Office (PMO)	
	B.5.4 Use of structured project management method PRINCE2	
	B.5.5 Other. Please specify.	
B.6 Project management	B.6.1 Rank project elements up front	
	B.6.2 Avoid big bangs	
	B.6.3 Limit the size of the project teams (small teams have less communication problems)	
	B.6.4 Fit the methodology to the project, not the other way around	
	B.6.5 Design twice, do work once	
	B.6.6 Do not re-invent the wheel	
	B.6.7 Separate concerns (technical people should make technical choices and functional people should make functional choices)	

		B.6.8 Involve the users	
		B.6.9 Other. Please specify.	
B.7	**Change management**	B.7.1 Management commitment to IM projects	
		B.7.2 Applied change management for IM projects	
		B.7.3 Involve all stakeholders	
		B.7.4 Identify barriers to change	
		B.7.5 Clarify the need for change	
		B.7.6 Treat each problem as unique	
		B.7.7 Focus on the purpose of problem-solving	
		B.7.8 Other. Please specify.	
B.8	**Risk management**	B.8.1 Risk management framework implemented	
		B.8.2 Applied risk analysis	
		B.8.3 Risk management plan in place	
		B.8.4 Written business plan	
		B.8.5 Risk management is a part of business plan	
		B.8.6 Use of ISO 17799 standard	
		B.8.7 Risk controls are mapped to regulations such as Sarbanes–Oxley	
		B.8.8 Other. Other. Please specify.	
B.9	**Asset management**	B.9.1 Defined policy for IT asset procurement and security	
		B.9.2 Use of asset tags for physical devices	
		B.9.3 Track and monitor assets life cycle	
		B.9.4 Technology disposal policy in place	
		B.9.5 Asset tracking in place	
		B.9.6 Applied standard naming scheme for assets	
		B.9.7 Backup procedures defined and implemented	
		B.9.8 Fire protection system installed for computer room	
		B.9.9 Standard shutdown procedures in place	
		B.9.10 Defined and tested disaster recovery plan	
		B.9.11 More expensive equipment insured	
		B.9.12 Software Asset Management (SAM) policy in place	
		B.9.13 Software Usage Policy in place	

	B.9.14 Other. Please specify.	
B.10 Knowledge management	B.10.1 Regular assessment of company's intangible assets	
	B.10.2 Developed intellectual asset management strategy	
	B.10.3 Automated business processes for capturing knowledge into rules and metadata	
	B.10.4 Access to data provided to all stakeholders	
	B.10.5 Other. Please specify.	
B.11 Information security	B.11.1 Software controls in place to monitor the use of system software	
	B.11.2 Hardware controls in place to ensure that computer hardware is physically secure	
	B.11.3 Computer operations controls in place for computer operations	
	B.11.4 Data security controls for data files	
	B.11.5 Implementation controls in place	
	B.11.6 Administrative controls in place to ensure that the organisation's general and application controls are properly executed and enforced	
	B.11.7 Use of BS7799 standard	
	B.11.8 Security policy in place	
	B.11.9 Assets classification procedure and control defined and implemented	
	B.11.10 Personnel security in place	
	B.11.11 System access control implemented	
	B.11.12 Business contingency plan in place	
	B.11.13 Information security policy documented	
	B.11.14 Information security education and training in place	
	B.11.15 Reporting of security incidents in place	
	B.11.16 Virus control implemented	
	B.11.17 Business continuity plan in place	
	B.11.18 Defined control of proprietary copying	
	B.11.19 Document control system implemented	
	B.11.20 Auditing systems in place	
	B.11.21 Other. Please specify.	
B.12 Business processes	B.12.1 Build generic solution for business processes	
	B.12.2 Standardise on software for capturing business processes	
	B.12.3 Document business processes	
	B.12.4 Change control for business processes	

		in place	
	B.12.5	Other. Please specify.	
B.13 IM balanced scorecard	B.13.1	Include financial measures	
	B.13.2	Include customer satisfaction measures	
	B.13.3	Learning and growth measures included	
	B.13.4	Link compensation to the scorecard	
	B.13.5	Link strategy to the budgeting process	
	B.13.6	Regular management meeting to review strategy	
	B.13.7	Other. Please specify.	
B.14 Benchmarking	B.14.1	Differentiate between strategic benchmarking; competitive benchmarking; customer benchmarking; financial benchmarking; and best practice benchmarking	
	B.14.2	Establish teams to lead the process, learning and acting on results	
	B.14.3	Comprehensive and accurate information on competing businesses need to be available	
	B.14.4	Benchmarks should directly relate to the company's overall business plans	
	B.14.5	Benchmarks that are established must be flexible and able to change with the external environment	
	B.14.6	Secure senior management support	
	B.14.7	Make sure that benchmarking is a team activity	
	B.14.8	Other. Please specify.	
B.15 Business intelligence	B.15.1	Partnering with experienced consulting groups or vendors	
	B.15.2	Support and training in place	
	B.15.3	Appropriate tools for querying and analyzing data, including visualisation, communication, Online Application Processing (OLAP), etc	
	B.15.4	Other. Please specify.	
B.16 Virtual collaboration	B.16.1	Establish rapport and trust among the project players	
	B.16.2	Build an efficient network	
	B.16.3	Research your options before making an investment	
	B.16.4	Develop and communicate norms across remote and diverse units	
	B.16.5	Develop and sustain shared goals	

		within diverse groups	
	B.16.6	Identify and support interaction of like-minded individuals or special interest groups across traditional boundaries	
	B.16.7	Foster exchange of personalised knowledge	
	B.16.8	Start small	
	B.16.9	Don't neglect change management	
	B.16.10	Optimize the value chain	
	B.16.11	Create effective governance mechanisms	
	B.16.12	Measure progress and effectiveness	
	B.16.13	Follow an open-system model	
	B.16.14	Incorporate innovation and entrepreneurship	
	B.16.15	Other. Please specify.	
B.17 Competitive intelligence	B.17.1	Top management support, participation and utilisation	
	B.17.2	Tailored infrastructure and correct placing	
	B.17.3	Using the right people	
	B.17.4	Ensuring sustained focus on key intelligence needs	
	B.17.5	Availability of resources (finance, people)	
	B.17.6	Presence of a network of human sources	
	B.17.7	Prevalence of a competitive culture	
	B.17.8	Proper, in-depth analysis	
	B.17.9	Demand-driven production of appropriately developed intelligence products. eg. competitor profiles, profit and loss analyses, news briefs, intelligence alert	
	B.17.10	Ensuring ethical and legal practices	
	B.17.11	Continued sensitising and marketing	
	B.17.12	Other. Please specify.	
B.18 Business partnering	B.18.1	In-depth understanding of the business	
	B.18.2	Provide the business with strategic systems	
	B.18.3	Provide support systems	
	B.18.4	Actively participate in the business	
	B.18.5	Align IM strategy to business strategy	
	B.18.6	Other. Please specify.	
B.19 Other. Please specify.....	B.19.1	.....	
	B.19.2	.....	
	B.19.3	.....	
	B.19.4	.....	

	B.19.5	
	B.19.6	
	B.19.7	
	B.19.8	
	B.19.9	

QUESTIONNAIRE - PART 4

C.1 Please state the type of industry you work in:
.....

C.2 Please name the company you work for: .....

End of Questionnaire!!!

Thank you for your time.

8.2 Appendix B: The list of companies to which the questionnaire was sent

COMPANY NAME	SECTOR	INDUSTRY TYPE
B & E International (Pty) Ltd	Primary Sector	Mining
De Beers	Primary Sector	Mining
Kumba Resources Limited	Primary Sector	Metals and Minerals Mining
Meghem	Primary Sector	Petrochemical
Petro SA (Pty) Ltd	Primary Sector	Oil and Gas
Sanoco Oil Company (Pty) Ltd	Primary Sector	Oil and Gas
Sasol	Primary Sector	Oil and Gas
Amitech	Secondary Sector	Manufacturing
Aspen Pharmacare Holdings Ltd	Secondary Sector	Health
Atlantic Forming (Pty) Ltd	Secondary Sector	Health
BKS Group (Pty) Ltd	Secondary Sector	General Industries
Bokomo Foods	Secondary Sector	Non-Cyclical Consumer Goods
Bryan Westcott (Pty) Ltd	Secondary Sector	Basic Industries
Cecil Nurse Business Furniture	Secondary Sector	Cyclical Consumer Goods
Dow	Secondary Sector	Plastics
DPI Plastics (Pty) Ltd	Secondary Sector	Basic Industries
EOH Consulting Services (Pty) Ltd.	Secondary Sector	Consulting
GE Infrastructure	Secondary Sector	Water & Process Technologies
Holcim	Secondary Sector	General Industries
Instrumentation & Electrical (PTY)	Secondary Sector	Basic Industries
J van der Sluys (Pty) Ltd	Secondary Sector	Basic Industries
Malesela Taihan Electric Cable (Pty) Ltd	Secondary Sector	General Industries
Medihelp Medical Scheme	Secondary Sector	Health
Nampak	Secondary Sector	Packaging
Nashua Ltd	Secondary Sector	General Industries
Pasdec Resources SA Ltd	Secondary Sector	General Industries
Prime Office Technology (Pty)Ltd	Secondary Sector	Office Automation
Pro Sano Medical Scheme	Secondary Sector	Health
Quality Beverages 2000 (Pty) Ltd	Secondary Sector	Non-Cyclical Consumer Goods
Roadgrip Afrityre (Pty) Ltd	Secondary Sector	Cyclical Consumer Goods
SEW Eurodrive (Pty) Ltd	Secondary Sector	Cyclical Consumer Goods
Sizwe Medical Services (Pty) Ltd	Secondary Sector	Health
Slagment (Pty) Ltd	Secondary Sector	Cementitious Material Manufacturing
Steinhoff International Holdings Ltd	Secondary Sector	Cyclical Consumer Goods
Süd-Chemie Water & Process Technologies(Pty) Ltd	Secondary Sector	Basic Industries
The South African Breweries Ltd	Secondary Sector	Non-Cyclical Consumer Goods
The South African Nuclear Energy Corporation (NECSA)	Secondary Sector	Basic Industries
UAP Crop Care (Pty) Ltd	Secondary Sector	Basic Industries
ABSA	Tertiary Sector	Investment Banking
Accenture	Tertiary Sector	IT Consulting
Achievement Awards Group (Pty) Ltd	Tertiary Sector	Support Services
African Freight Express	Tertiary Sector	Transport
AllPay Consolidated	Tertiary Sector	Financials
Atlas Copco SA (Pty) Ltd	Tertiary Sector	Retail and Trade
BCX	Tertiary Sector	Information Technology
Bently West	Tertiary Sector	Consulting

Berry & Donaldson (Pty) Ltd	Tertiary Sector	Transport
Bloem Water	Tertiary Sector	Utilities
BluESP (Pty) Ltd.	Tertiary Sector	Information Technology
Bulktrans (Pty) Ltd	Tertiary Sector	Transport
Bytes Technology Group	Tertiary Sector	Financial Services
Cashbuild South Africa (Pty) Ltd	Tertiary Sector	Retail and Trade
Cointel V.A.S. (Pty) Ltd	Tertiary Sector	Non-Cyclical Services
Crontrans	Tertiary Sector	Tranportation
Cueincident (Pty) Ltd	Tertiary Sector	Support Services
Development Bank of Southern Africa	Tertiary Sector	Financials
Didata	Tertiary Sector	Information Technology
Disa Hotels (Pty) Ltd t/a Days Inn	Tertiary Sector	Leisure, Entertainment and Hotels
EnviroServ Waste Management	Tertiary Sector	Waste Management
eQuals Group (Pty) Ltd	Tertiary Sector	Support Services
Ericsson South Africa (Pty) Ltd 397, 408	Tertiary Sector	Non-Cyclical Services
Eskom	Tertiary Sector	Energy
ESP Solutions	Tertiary Sector	Information Technology
Esselenpark Making it Possible	Tertiary Sector	Support Services
Futuristix	Tertiary Sector	Information Technology
Gemplus Southern Africa (Pty) Ltd	Tertiary Sector	Non-Cyclical Services
Hetzner cc t/a Hetzner Africa	Tertiary Sector	Information Technology
Hi-Fi Corporation	Tertiary Sector	Retail and Trade
Hlano Financial Services (Pty) Ltd	Tertiary Sector	Financials
i Talk Cellular (Pty) Ltd	Tertiary Sector	Telecommunications Services
IBM	Tertiary Sector	Information Technology
ICC Durban (Pty) Ltd	Tertiary Sector	Support Services
Indiza Media	Tertiary Sector	Media and Photography
Kirsch Pharma (Pty) Ltd	Tertiary Sector	Non-Cyclical Services
Land & Agricultural Bank of South Africa	Tertiary Sector	Financials
Liberty Group Properties (Pty) Ltd	Tertiary Sector	Financials
Louis Group International Limited	Tertiary Sector	Financials
Mediterranean Shipping Company (Pty) Ltd	Tertiary Sector	Transport
Microsoft	Tertiary Sector	Information Technology
Midway Two Group Ltd	Tertiary Sector	Support Services
MTN	Tertiary Sector	Telecommunications Services
National Ports Authority	Tertiary Sector	Transport
Nedbank	Tertiary Sector	Banking
Neledzi Cleaning Services	Tertiary Sector	Support Services
Pam Golding Properties (Pty) Ltd	Tertiary Sector	Financials
Pebbletree Consulting	Tertiary Sector	Professional Services
Pernod Ricard SA (Pty) Ltd	Tertiary Sector	Retail and Trade
Phambili Information Technologies (Pty) Ltd	Tertiary Sector	Information Technology
Prestige Cleaning Services (Pty) Ltd	Tertiary Sector	Support Services
Protea Security Services (Pty) Ltd	Tertiary Sector	Support Services
Quad Automation	Tertiary Sector	Information Technology
Rand Water	Tertiary Sector	Utilities
Real People Investment	Tertiary Sector	Financials
RealIRM	Tertiary Sector	Consulting
Rentworks Africa (Pty) Ltd	Tertiary Sector	Financials
SAP	Tertiary Sector	Information Technology

Scooters Pizza (Pty) Ltd	Tertiary Sector	Leisure, Entertainment and Hotels
Sentech Ltd	Tertiary Sector	Media and Photography
Senwes Limited	Tertiary Sector	Support Services
South African Rail Commuter	Tertiary Sector	Transport
StandardBank	Tertiary Sector	Financial Services
Storm Telecom (Pty) Ltd	Tertiary Sector	Non-Cyclical Services
Stuttafords Stores (Pty) Ltd	Tertiary Sector	Retail
Telepassport (Pty) Ltd	Tertiary Sector	Non-Cyclical Services
Telkom	Tertiary Sector	Telecommunications Services
Truworths International Ltd	Tertiary Sector	Retail and Trade
Umgeni Water	Tertiary Sector	Utilities
Universal Footwear (Pty) Ltd	Tertiary Sector	Retail and Trade
Victoria & Alfred Waterfront (Pty) Ltd	Tertiary Sector	Retail and Trade
Wasteman Group (Pty) Ltd	Tertiary Sector	Support Services

8.3 Appendix C: An e-mail sent to potential participants for the online survey

Dear Sir/Madam

Reference: Our telephone conversation on dd MMMM yyyy

May you please respond to this questionnaire.

Please forward it to the people that you know that can contribute as well. The targeted audience is: IT/IM managers and specialists, financial managers and business managers from broad base industries in South Africa.

Information Management: Best practices in broad base industries

As one of the top 300 companies in South Africa, you have been selected to partake in the attached survey regarding **Information Management: Best practices in broad base industries.** Your insight regarding the topic would be greatly appreciated and beneficial to the academic research.

To complete the survey online

Click Here

or if the link is inactive copy the following text http://www.santie.co.za/is/ and paste into your internet browser

The success of this survey is dependent on the amount of quality responses that we get from all sizes of businesses, representing all industry sectors. We would appreciate if you could take the time to complete this survey, or forward it to the most appropriate person in your organisation. This questionnaire is part of my mini-dissertation that is required as the final part of my MBA studies at the North-West University. The topic registered with the university is: **Information Management: Best practices in broad base industries.** Responses are confidential and will only be used for academic purposes. It will not be shared with any other organisation for commercial gain or further analysis.

For more details on my mini-dissertation topic or issues with the questionnaire please contact me on +27 83 630 7559 and/or e-mail: pejanot0@mweb.co.za. Alternatively contact my study leader, Mr JC Coetzee on +27 18 299 4012 and/or e-mail: pbsjcc@puk.ac.za

To our appreciation of your participation in the survey, we will e-mail you the final research results.

Thank you for your participation.

Yours sincerely

T Pejanovic
MBA Student
North-West University

8.4 Appendix D: Responses received for Questionnaire

Response Number	Participant	Company	Sector
1	Operations manager	Amitech	Secondary Sector
2	Business Development	ESP Solutions	Tertiary Sector
3	Divisional Key Accounts Manager	Nampak Corrugated	Secondary Sector
4	Maintenance Manager	Eskom Holdings Limited	Tertiary Sector
5	Plant Manager	Slagment (Pty) Ltd	Secondary Sector
6	Operations Manager	Bytes Technology Group	Tertiary Sector
7	CEO	IDC Technologies	Secondary Sector
8	CIO	Crontrans	Tertiary Sector
9	Business Analyst	Private	Tertiary Sector
10	CEO	BluESP	Tertiary Sector
11	Marketing Director	B&W Instrumentation & Electrial	Secondary Sector
12	Consultant	Palladium	Tertiary Sector
13	Banker	Nedbank	Tertiary Sector
14	Maintenance technologist	Dow Plastics SA	Secondary Sector
15	IT Departmental Manager	De Beers	Primary Sector
16	Services Sector Executive	IBM South Africa	Tertiary Sector
17	Consultant	Bytes Technology Group	Tertiary Sector
18	Director	EOH	Secondary Sector
19	Director & Shareholder	Prime Office Technology (Pty)Ltd	Secondary Sector
20	Information Management Manager	Mittal Steel	Secondary Sector
21	Consultant	Microsoft	Tertiary Sector
22	Managing Director	General Electric	Secondary Sector
23	Manager	Sasol	Primary Sector
24	N/A	SAP	Tertiary Sector
25	Director : Sales	IBM	Tertiary Sector
26	N/A	Mittal Steel	Secondary Sector
27	CEO	Pebbletree Consulting	Tertiary Sector
28	CIO	Absa Capital	Tertiary Sector
29	Head of mechanical business unit	MegChem	Primary Sector
30	Operations engineer	Dimension Data	Tertiary Sector
31	Principal consultant	Business Connexion	Tertiary Sector
32	Sales Manager	BluESP	Tertiary Sector
33	Group Financial Manager	Enviroserv	Tertiary Sector
35	CIO	Sanlam	Tertiary Sector
36	Operations Manager	Sasol	Primary Sector
37	Senior Executive	Accenture	Tertiary Sector
38	Consultant	Real IRM Solutions	Tertiary Sector
39	Business Developmemt Manager	Arivia.kom	Tertiary Sector
40	CFO	Business Connexion	Tertiary Sector
41	Business Systems Manager	Sasol Polymers	Primary Sector
42	CIO	Real Peolpe	Tertiary Sector
43	Chief Sales Officer	Dimension Data Plc	Tertiary Sector
44	CIO	Pam Golding Properties	Tertiary Sector
45	CFO	Louis Group	Tertiary Sector
46	EA Consultant	Real IRM Solutions	Tertiary Sector
47	IT Product Manager	Business Connexion	Tertiary Sector
48	Group Executive	Business Connexion	Tertiary Sector
49	IT Manager Enterprise Technology	Standard Corporate and Investment Bank	Tertiary Sector

8.5 Appendix E: Results of the descriptive statistical tests

The CORR Procedure (Information Management)

5 Variables: B4 B8 B11 B12 B15

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
B4	23	2.86957	1.39167	66.00000	1.00000	5.00000
B8	22	3.22727	1.50971	71.00000	1.00000	5.00000
B11	28	2.96429	1.23175	83.00000	1.00000	5.00000
B12	24	3.58333	1.47196	86.00000	1.00000	5.00000
B15	21	3.85714	1.31475	81.00000	1.00000	5.00000

The CORR Procedure (Information Management Governance - Best Practices)

5 Variables: B4.1 B4.2 B4.3 B4.5 B4.6

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
B4.1	23	4.13043	1.01374	95.00000	2.00000	5.00000
B4.2	24	4.08333	0.82970	98.00000	2.00000	5.00000
B4.3	24	4.25000	0.84699	102.00000	2.00000	5.00000
B4.5	24	4.87500	0.33783	117.00000	4.00000	5.00000
B4.6	24	4.25000	0.89685	102.00000	3.00000	5.00000

Cronbach Coefficient Alpha

Variables	Alpha
Raw	0.139465
Standardized	0.068313

Cronbach Coefficient Alpha with Deleted Variable

	Raw Variables		Standardized Variables	
Deleted Variable	Correlation with Total	Alpha	Correlation with Total	Alpha
B4.1	0.015441	0.182919	-.081735	0.184211
B4.2	0.033762	0.144645	0.145979	-.098233
B4.3	0.160890	-.010077	0.076001	-.004819
B4.5	-.130017	0.206363	-.099625	0.203874
B4.6	0.148528	-.002072	0.127410	-.072845

The CORR Procedure

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	B4.1	B4.2	B4.3	B4.5	B4.6
B4.1	1.00000	-0.00709	0.11503	-0.33968	0.05566
		0.9744	0.6012	0.1128	0.8009
	23	23	23	23	23
B4.2	-0.00709	1.00000	-0.03093	0.34901	-0.02921
	0.9744		0.8859	0.0946	0.8922
	23	24	24	24	24
B4.3	0.11503	-0.03093	1.00000	-0.18993	0.25756
	0.6012	0.8859		0.3740	0.2243
	23	24	24	24	24
B4.5	-0.33968	0.34901	-0.18993	1.00000	-0.03587
	0.1128	0.0946	0.3740		0.8678
	23	24	24	24	24
B4.6	0.05566	-0.02921	0.25756	-0.03587	1.00000
	0.8009	0.8922	0.2243	0.8678	
	23	24	24	24	24

The CORR Procedure (Risk Management - Best Practices)

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5 Variables: B8.1 B8.2 B8.3 B8.4 B8.5

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
B8.1	22	4.31818	1.04135	95.00000	2.00000	5.00000
B8.2	21	4.28571	0.71714	90.00000	3.00000	5.00000
B8.3	21	4.38095	0.74001	92.00000	3.00000	5.00000
B8.4	21	4.19048	1.07792	88.00000	1.00000	5.00000
B8.5	21	4.47619	0.74960	94.00000	2.00000	5.00000

Cronbach Coefficient Alpha

Variables	Alpha
Raw	0.826303
Standardized	0.845918

Cronbach Coefficient Alpha with Deleted Variable

	Raw Variables		Standardized Variables	
Deleted Variable	Correlation with Total	Alpha	Correlation with Total	Alpha
B8.1	0.642871	0.789779	0.677305	0.807946
B8.2	0.657254	0.787898	0.657066	0.813425

B8.3	0.783501	0.755048	0.776057	0.780455
B8.4	0.461319	0.853616	0.483525	0.858284
B8.5	0.701832	0.774891	0.683518	0.806254

The CORR Procedure

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	B8.1	B8.2	B8.3	B8.4	B8.5
B8.1	1.00000	0.67937	0.81381	0.21344	0.45135
		0.0007	<.0001	0.3529	0.0400
	22	21	21	21	21
B8.2	0.67937	1.00000	0.63260	0.31417	0.47834
	0.0007		0.0021	0.1655	0.0283
	21	21	21	21	21
B8.3	0.81381	0.63260	1.00000	0.40594	0.55799
	<.0001	0.0021		0.0679	0.0086
	21	21	21	21	21
B8.4	0.21344	0.31417	0.40594	1.00000	0.68658
	0.3529	0.1655	0.0679		0.0006
	21	21	21	21	21
B8.5	0.45135	0.47834	0.55799	0.68658	1.00000
	0.0400	0.0283	0.0086	0.0006	
	21	21	21	21	21

The CORR Procedure (Information security - Best practices)

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5 Variables: B11.4 B11.8 B11.10 B11.11 B11.16

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
B11.4	28	4.25000	0.79931	119.00000	3.00000	5.00000
B11.8	29	4.13793	1.05979	120.00000	1.00000	5.00000
B11.10	28	4.32143	0.54796	121.00000	3.00000	5.00000
B11.11	29	4.55172	0.86957	132.00000	1.00000	5.00000
B11.16	29	4.86207	0.35093	141.00000	4.00000	5.00000

Cronbach Coefficient Alpha

Variables	Alpha
Raw	0.471262
Standardized	0.526984

Cronbach Coefficient Alpha with Deleted Variable

Deleted Variable	Raw Variables: Correlation with Total	Raw Variables: Alpha	Standardized Variables: Correlation with Total	Standardized Variables: Alpha
B11.4	0.281949	0.393846	0.379593	0.415977
B11.8	0.317321	0.374611	0.268302	0.486467
B11.10	-.126625	0.587677	-.028282	0.649779
B11.11	0.404273	0.289285	0.312302	0.459231
B11.16	0.587140	0.343291	0.614789	0.248807

The CORR Procedure

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	B11.4	B11.8	B11.10	B11.11	B11.16
B11.4	1.00000	0.12884	0.14798	0.11832	0.52013
		0.5135	0.4524	0.5487	0.0046
	28	28	28	28	28
B11.8	0.12884	1.00000	-0.33114	0.53454	0.34107
	0.5135		0.0852	0.0028	0.0702
	28	29	28	29	29
B11.10	0.14798	-0.33114	1.00000	-0.13971	0.24387
	0.4524	0.0852		0.4783	0.2111
	28	28	28	28	28
B11.11	0.11832	0.53454	-0.13971	1.00000	0.25828
	0.5487	0.0028	0.4783		0.1761
	28	29	28	29	29
B11.16	0.52013	0.34107	0.24387	0.25828	1.00000
	0.0046	0.0702	0.2111	0.1761	
	28	29	28	29	29

The CORR Procedure (Business Processes - Best practices)

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4 Variables: B12.1 B12.2 B12.3 B12.4

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
B12.1	25	4.00000	0.86603	100.00000	2.00000	5.00000
B12.2	25	4.12000	0.83267	103.00000	2.00000	5.00000
B12.3	25	4.32000	0.90000	108.00000	2.00000	5.00000
B12.4	25	4.12000	0.97125	103.00000	2.00000	5.00000

Cronbach Coefficient Alpha

Variables	Alpha
Raw	0.570861
Standardized	0.559417

Cronbach Coefficient Alpha with Deleted Variable

Deleted Variable	Raw Variables: Correlation with Total	Raw Variables: Alpha	Standardized Variables: Correlation with Total	Standardized Variables: Alpha
B12.1	0.044512	0.714693	0.043024	0.708606
B12.2	0.295075	0.542906	0.285410	0.534174
B12.3	0.596172	0.282313	0.579198	0.274403
B12.4	0.551895	0.309859	0.547718	0.304983

Pearson Correlation Coefficients, N = 25
Prob > |r| under H0: Rho=0

	B12.1	B12.2	B12.3	B12.4
B12.1	1.00000	-0.05778 0.7838	0.16038 0.4438	0.00000 1.0000
B12.2	-0.05778 0.7838	1.00000	0.28022 0.1749	0.39362 0.0516
B12.3	0.16038 0.4438	0.28022 0.1749	1.00000	0.66924 0.0003

The CORR Procedure

Pearson Correlation Coefficients, N = 25
Prob > |r| under H0: Rho=0

	B12.1	B12.2	B12.3	B12.4
B12.4	0.00000 1.0000	0.39362 0.0516	0.66924 0.0003	1.00000

The CORR Procedure (Business intelligence - Best practices)

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3 Variables: B15.1 B15.2 B15.3

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
B15.1	21	3.95238	0.92066	83.00000	2.00000	5.00000
B15.2	21	4.33333	0.85635	91.00000	2.00000	5.00000
B15.3	21	4.28571	0.84515	90.00000	2.00000	5.00000

Cronbach Coefficient Alpha

Variables	Alpha
Raw	0.335749
Standardized	0.347530

Cronbach Coefficient Alpha with Deleted Variable

Deleted Variable	Raw Variables: Correlation with Total	Raw Variables: Alpha	Standardized Variables: Correlation with Total	Standardized Variables: Alpha
B15.1	0.023495	0.586047	0.022485	0.586082
B15.2	0.412626	-.246575	0.421639	-.247591
B15.3	0.188237	0.257218	0.200860	0.257806

Pearson Correlation Coefficients, N = 21
Prob > |r| under H0: Rho=0

	B15.1	B15.2	B15.3
B15.1	1.00000	0.14798 0.5221	-0.11016 0.6345
B15.2	0.14798 0.5221	1.00000	0.41451 0.0617
B15.3	-0.11016 0.6345	0.41451 0.0617	1.00000

Descriptive statistics are a way of summarising the variables in a dataset. Below is an explanation of each of the columns above.

Variable: The name of each variable for which descriptive statistics have been calculated.

N: The number of cases for each variable.

Mean: The average value for the variable.

StdDev: The standard deviation - an indication of how closely values are clustered around the mean. Approximately 68% of cases lie between one standard deviation below and one standard deviation above the mean.

Minimum: The smallest value obtained for a variable.

Maximum: The largest value obtained for a variable.

8.6 Appendix F: Frequency tabulations

Variable	Value	N	%	Cum. %
A1	0	46	93.88	93.88
	1	3	6.12	100
A2	0	47	95.92	95.92
	1	2	4.08	100
A3	0	44	89.8	89.8
	1	5	10.2	100
A4	0	13	26.53	26.53
	1	36	73.47	100
B1	0	34	69.39	69.39
	1	15	30.61	100
B2	0	40	81.63	81.63
	1	9	18.37	100
B3	0	43	87.76	87.76
	1	6	12.24	100
B4	0	26	53.06	53.06
	1	23	46.94	100
B5	0	32	65.31	65.31
	1	17	34.69	100
B6	0	38	77.55	77.55
	1	11	22.45	100
B7	0	31	63.27	63.27
	1	18	36.73	100
B8	0	27	55.1	55.1
	1	22	44.9	100
B9	0	39	79.59	79.59
	1	10	20.41	100
B10	0	36	73.47	73.47
	1	13	26.53	100
B11	0	21	42.86	42.86
	1	28	57.14	100
B12	0	25	51.02	51.02
	1	24	48.98	100
B13	0	43	87.76	87.76
	1	6	12.24	100
B14	0	47	95.92	95.92
	1	2	4.08	100
B15	0	28	57.14	57.14
	1	21	42.86	100
B16	0	46	93.88	93.88
	1	3	6.12	100
B17	0	42	85.71	85.71
	1	7	14.29	100
B18	0	42	85.71	85.71
	1	7	14.29	100
B19	0	47	95.92	95.92
	1	2	4.08	100
B1.1	0	21	42.86	42.86
	1	28	57.14	100
B1.2	0	25	51.02	51.02

	1	24	48.98	100
B1.3	0	43	87.76	87.76
	1	6	12.24	100
B1.4	0	47	95.92	95.92
	1	2	4.08	100
B1.5	0	28	57.14	57.14
	1	21	42.86	100
B1.6	0	46	93.88	93.88
	1	3	6.12	100
B1.7	0	42	85.71	85.71
	1	7	14.29	100
B1.8	0	42	85.71	85.71
	1	7	14.29	100
B2.1	0	41	83.67	83.67
	1	8	16.33	100
B2.2	0	40	81.63	81.63
	1	9	18.37	100
B2.3	0	41	83.67	83.67
	1	8	16.33	100
B2.4	0	40	81.63	81.63
	1	9	18.37	100
B2.5	0	41	83.67	83.67
	1	8	16.33	100
B2.6	0	41	83.67	83.67
	1	8	16.33	100
B2.7	0	49	100	100
B3.1	0	43	87.76	87.76
	1	6	12.24	100
B3.2	0	43	87.76	87.76
	1	6	12.24	100
B3.3	0	43	87.76	87.76
	1	6	12.24	100
B3.4	0	43	87.76	87.76
	1	6	12.24	100
B3.5	0	43	87.76	87.76
	1	6	12.24	100
B3.6	0	49	100	100
B4.1	0	26	53.06	53.06
	1	23	46.94	100
B4.2	0	25	51.02	51.02
	1	24	48.98	100
B4.3	0	25	51.02	51.02
	1	24	48.98	100
B4.4	0	25	51.02	51.02
	1	24	48.98	100
B4.5	0	25	51.02	51.02
	1	24	48.98	100
B4.6	0	25	51.02	51.02
	1	24	48.98	100
B4.7	0	25	51.02	51.02
	1	24	48.98	100
B4.8	0	26	53.06	53.06
	1	23	46.94	100

B4.9	0	49	100	100
B5.1	0	32	65.31	65.31
	1	17	34.69	100
B5.2	0	31	63.27	63.27
	1	18	36.73	100
B5.3	0	31	63.27	63.27
	1	18	36.73	100
B5.4	0	32	65.31	65.31
	1	17	34.69	100
B5.5	0	46	93.88	93.88
	1	3	6.12	100
B6.1	0	38	77.55	77.55
	1	11	22.45	100
B6.2	0	38	77.55	77.55
	1	11	22.45	100
B6.3	0	38	77.55	77.55
	1	11	22.45	100
B6.4	0	38	77.55	77.55
	1	11	22.45	100
B6.5	0	38	77.55	77.55
	1	11	22.45	100
B6.6	0	38	77.55	77.55
	1	11	22.45	100
B6.7	0	38	77.55	77.55
	1	11	22.45	100
B6.8	0	38	77.55	77.55
	1	11	22.45	100
B6.9	0	49	100	100
B7.1	0	32	65.31	65.31
	1	17	34.69	100
B7.2	0	33	67.35	67.35
	1	16	32.65	100
B7.3	0	32	65.31	65.31
	1	17	34.69	100
B7.4	0	33	67.35	67.35
	1	16	32.65	100
B7.5	0	33	67.35	67.35
	1	16	32.65	100
B7.6	0	33	67.35	67.35
	1	16	32.65	100
B7.7	0	33	67.35	67.35
	1	16	32.65	100
B7.8	0	49	100	100
B8.1	0	27	55.1	55.1
	1	22	44.9	100
B8.2	0	28	57.14	57.14
	1	21	42.86	100
B8.3	0	28	57.14	57.14
	1	21	42.86	100
B8.4	0	28	57.14	57.14
	1	21	42.86	100
B8.5	0	28	57.14	57.14
	1	21	42.86	100

B8.6	0	28	57.14	57.14
	1	21	42.86	100
B8.7	0	27	55.1	55.1
	1	22	44.9	100
B8.8	0	49	100	100
B9.1	0	40	81.63	81.63
	1	9	18.37	100
B9.2	0	39	79.59	79.59
	1	10	20.41	100
B9.3	0	39	79.59	79.59
	1	10	20.41	100
B9.4	0	40	81.63	81.63
	1	9	18.37	100
B9.5	0	39	79.59	79.59
	1	10	20.41	100
B9.6	0	40	81.63	81.63
	1	9	18.37	100
B9.7	0	39	79.59	79.59
	1	10	20.41	100
B9.8	0	40	81.63	81.63
	1	9	18.37	100
B9.9	0	40	81.63	81.63
	1	9	18.37	100
B9.10	0	39	79.59	79.59
	1	10	20.41	100
B9.11	0	40	81.63	81.63
	1	9	18.37	100
B9.12	0	40	81.63	81.63
	1	9	18.37	100
B9.13	0	40	81.63	81.63
	1	9	18.37	100
B9.14	0	49	100	100
B10.1	0	36	73.47	73.47
	1	13	26.53	100
B10.2	0	36	73.47	73.47
	1	13	26.53	100
B10.3	0	36	73.47	73.47
	1	13	26.53	100
B10.4	0	36	73.47	73.47
	1	13	26.53	100
B10.5	0	49	100	100
B11.1	0	21	42.86	42.86
	1	28	57.14	100
B11.2	0	21	42.86	42.86
	1	28	57.14	100
B11.3	0	21	42.86	42.86
	1	28	57.14	100
B11.4	0	21	42.86	42.86
	1	28	57.14	100
B11.5	0	21	42.86	42.86
	1	28	57.14	100
B11.6	0	21	42.86	42.86
	1	28	57.14	100

B11.7	0	21	42.86	42.86
	1	28	57.14	100
B11.8	0	20	40.82	40.82
	1	29	59.18	100
B11.9	0	21	42.86	42.86
	1	28	57.14	100
B11.10	0	21	42.86	42.86
	1	28	57.14	100
B11.11	0	20	40.82	40.82
	1	29	59.18	100
B11.12	0	20	40.82	40.82
	1	29	59.18	100
B11.13	0	21	42.86	42.86
	1	28	57.14	100
B11.14	0	20	40.82	40.82
	1	29	59.18	100
B11.15	0	21	42.86	42.86
	1	28	57.14	100
B11.16	0	20	40.82	40.82
	1	29	59.18	100
B11.17	0	21	42.86	42.86
	1	28	57.14	100
B11.18	0	21	42.86	42.86
	1	28	57.14	100
B11.19	0	21	42.86	42.86
	1	28	57.14	100
B11.20	0	20	40.82	40.82
	1	29	59.18	100
B11.21	0	48	97.96	97.96
	1	1	2.04	100
B12.1	0	24	48.98	48.98
	1	25	51.02	100
B12.2	0	24	48.98	48.98
	1	25	51.02	100
B12.3	0	24	48.98	48.98
	1	25	51.02	100
B12.4	0	24	48.98	48.98
	1	25	51.02	100
B12.5	0	49	100	100
B13.1	0	43	87.76	87.76
	1	6	12.24	100
B13.2	0	43	87.76	87.76
	1	6	12.24	100
B13.3	0	43	87.76	87.76
	1	6	12.24	100
B13.4	0	43	87.76	87.76
	1	6	12.24	100
B13.5	0	43	87.76	87.76
	1	6	12.24	100
B13.6	0	43	87.76	87.76
	1	6	12.24	100
B13.7	0	49	100	100
B14.1	0	47	95.92	95.92

	1	2	4.08	100
B14.2	0	47	95.92	95.92
	1	2	4.08	100
B14.3	0	47	95.92	95.92
	1	2	4.08	100
B14.4	0	47	95.92	95.92
	1	2	4.08	100
B14.5	0	47	95.92	95.92
	1	2	4.08	100
B14.6	0	47	95.92	95.92
	1	2	4.08	100
B14.7	0	47	95.92	95.92
	1	2	4.08	100
B14.8	0	49	100	100
B15.1	0	28	57.14	57.14
	1	21	42.86	100
B15.2	0	28	57.14	57.14
	1	21	42.86	100
B15.3	0	28	57.14	57.14
	1	21	42.86	100
B15.4	0	49	100	100
B16.1	0	47	95.92	95.92
	1	2	4.08	100
B16.2	0	46	93.88	93.88
	1	3	6.12	100
B16.3	0	46	93.88	93.88
	1	3	6.12	100
B16.4	0	46	93.88	93.88
	1	3	6.12	100
B16.5	0	47	95.92	95.92
	1	2	4.08	100
B16.6	0	47	95.92	95.92
	1	2	4.08	100
B16.7	0	47	95.92	95.92
	1	2	4.08	100
B16.8	0	47	95.92	95.92
	1	2	4.08	100
B16.9	0	47	95.92	95.92
	1	2	4.08	100
B16.10	0	46	93.88	93.88
	1	3	6.12	100
B16.11	0	47	95.92	95.92
	1	2	4.08	100
B16.12	0	47	95.92	95.92
	1	2	4.08	100
B16.13	0	47	95.92	95.92
	1	2	4.08	100
B16.14	0	46	93.88	93.88
	1	3	6.12	100
B16.15	0	49	100	100
B17.1	0	42	85.71	85.71
	1	7	14.29	100
B17.2	0	42	85.71	85.71

	1	7	14.29	100
B17.3	0	42	85.71	85.71
	1	7	14.29	100
B17.4	0	42	85.71	85.71
	1	7	14.29	100
B17.5	0	42	85.71	85.71
	1	7	14.29	100
B17.6	0	42	85.71	85.71
	1	7	14.29	100
B17.7	0	42	85.71	85.71
	1	7	14.29	100
B17.8	0	42	85.71	85.71
	1	7	14.29	100
B17.9	0	42	85.71	85.71
	1	7	14.29	100
B17.10	0	42	85.71	85.71
	1	7	14.29	100
B17.11	0	42	85.71	85.71
	1	7	14.29	100
B17.12	0	49	100	100
B18.1	0	42	85.71	85.71
	1	7	14.29	100
B18.2	0	42	85.71	85.71
	1	7	14.29	100
B18.3	0	42	85.71	85.71
	1	7	14.29	100
B18.4	0	42	85.71	85.71
	1	7	14.29	100
B18.5	0	42	85.71	85.71
	1	7	14.29	100
B18.6	0	49	100	100
B19.1	0	49	100	100
B19.2	0	49	100	100
B19.3	0	49	100	100
B19.4	0	49	100	100
B19.5	0	49	100	100
B19.6	0	49	100	100
B19.7	0	49	100	100
B19.8	0	49	100	100
B19.9	0	49	100	100
C1	1	49	100	100
C2	0	1	2.04	2.04
	1	48	97.96	100

A frequency tabulation is a listing of the values or scores and the frequencies with which they occur. The values are listed in the **"Value"** column and the number of cases obtaining each value in the **"N"** column. The **"%"** column shows the number of cases as a percentage. For example, in the table above the value of 1 was obtained by 48 cases, which is 97.96% of the cases.

The **"Cum. %"** (Cumulative Percentage) column shows what percentage of cases obtained a value equal to or less than the value.