CHAPTER 4

4. THE MANAGEMENT OF INFORMATION

4.1 Introduction

Information is an integral part of business. Like humans, businesses cannot survive without information; it acts as a lubricant to wheels of business and is a vital resource having the quality of conserving other resources. With this as a departure point, it follows that it is vitally important to manage this resource properly.

This viewpoint led to the use of the term "information management" and, later, "information resource(s) management" (IRM); both terms attempts to manage information.

Where the second chapter defined the term information and the third put information in context, this chapter will explore the concept of information management. What does it mean "to manage information" and, even more fundamentally, "*can* information be managed"?

4.2 Defining management

An organisation exists to supply a product or to render a service, regardless whether such organisation's motive is for profit or not. This process of conducting business cannot take place without the existence of an input, (production factors or resources), an output (a product or service) and a process by which the input is transformed into the output. In the process, value is added. This process is facilitated by what is called management; ensuring that the goals set are to be achieved. It takes place through certain *actions*: Planning, organising, leading and controlling of the production factors, resources and processes. During the entire process decisions are continuously being taken regarding all the actions.

Hence, management is "the process of planning and decision making, organizing, leading, and controlling an organization's human, financial, physical, and information resources to achieve organizational goals in an

efficient and effective manner" (Griffin, 1987: 8 - 9). The definition also identifies the purpose of management, namely, the realisation of the goals of the organisation in an effective and efficient way. The challenge to any manager is to mobilise and utilise the resources allocated to him in the correct "mix". To be effective means to be doing the right things; to be efficient, is to be doing things right (with the minimum waste).

A company generally has four kinds of resources at its disposal: Natural (physical), financial (money), human (labour) and information. It is only recently that some writers are including information as one of the resources.

The definition above points to a process as opposed to an event. Management is the continuous process of planning (and making decisions), organising, leading and controlling. These steps in the management process do not always follow in the same sequence; a manager would typically be involved in almost all of the steps throughout the day.

4.3 Defining information management and information resources management

Three distinct terms are found in the literature on information management: "Information management" itself, "information resources management" and the phrase "the management of information (as a resource)". Often these terms are used as synonyms, but many writers have something very specifically in mind when using the term. It needs to be clarified whether these terms are, in fact, synonyms and if they are found not to be, what the differences are between them.

4.3.1 Information resources management (IRM)

Adams (in White, 1986: 29) defines information resource management as "...a top management function to develop a set of policies, programs and procedures to efficiently and effectively plan, manage and control information requirements and supporting information handling resources". Why he specifically refers to

top management is not clear; surely other levels in the organisation need to be involved as well. It is, though, essential to obtain top management involvement and commitment to focus attention on the matter.

Bryce (1987: 89) defines IRM as: "...the management of data, people and processes that produce information that serves a business or functional need". Lee (1987: 4), commenting on the article of Bryce in a letter to the editor, disagrees with him in that processes are not resources. He writes: "They [processes] are ways of using resources; and the fundamental resources of today include: Information, people, information technologies, money, and facilities".

The Director of the Office of Management and Budget of the United States describes information resources management as "...the planning, budgeting, organizing, directing, training, and control associated with government information. The term encompasses both information itself and the related resources, such as personnel, equipment, funds and technology" (Miller, 1985: 52735).

Another Miller (1988: 3) defines IRM as an "...umbrella term that includes the management of such information resources as computer hardware, software, communications, internal and external data bases, planning and review, as well as the integration of these resources for the support of managing information for the organization as a whole." This definition hence focuses strongly on the management of information technology with a reference to the existence of other resources.

The above definitions make reference to information resources. That raises the question of what information resources are.

When the term information resources is used, information is usually regarded as "stuff" (Wilson, 1985: 62). According to Wilson the most important information resource is people. It is natural for anyone who wants to know something, to first try asking someone else. He also points out that almost no

organisation sets out to record its "knowledge holders" even though it is accepted that any newcomer to the organisation will spend "a great deal of time" to find out "who knows what".

Wilson (1985: 63) puts information resources into two main categories, namely internal resources and external resources, as follows:

Internal information resources:

- People - oral communication;
- Correspondence - mail, memoranda;
- Data, records, files (on activities/operations/personnel/etc.;
- Internal documentation (meeting papers, minutes, internal reports, etc.) and
- Graphic materials (maps, charts, diagrams, etc.).

External information resources

- People outside the organisation;
- Internal information resources of other organisations;
- "Published" information - books, journals, reports, government publications, statistical information;
- Mass media - news and
- Electronic databases and data banks (covering parts of both of the above items).

He points out that this list is not complete and concludes that information is a multi-media phenomenon because it involves sound (voice), numbers, text, pictures, moving pictures, graphics and more (Wilson, 1985: 63).

Horton (1979: 89) categorizes information resources into four groups, namely:

- Information sources (e.g. people, libraries);
- Information services (e.g. information bureaus);
- Information products (e.g. maps, cassettes, encyclopedias) and
- Information systems.

The information sources and systems are means-oriented, that is, they provide answers to the "where", "who" or "how" interrogatives, while the other two, information products and services are ends-oriented (the "what" interrogative). Horton warns that these categories overlap and that "...some ambiguity is virtually inevitable in the end" (Horton, 1979: 92).

Bryce (1987: 89) categorises information resources in three groups, namely, data, people and processes. Otten (1984: 22) defines information resources as "Everything that is involved in handling ...data and contributing to its use as information...".

Marchand *et al.* (1986: 71) define information resources as:

- Individuals;
- Information technology;
- Information facilities such as a library and
- Information providers.

It should be noted that Marchand includes information technology as an information resource. Information technology can, at most, be a storage medium or an information conduit. It will be shown later that information technology, like information systems and others, are all parts of the information infrastructure needed to facilitate the process.

The "resource" component in the phrase needs to be looked at in more detail. The American Heritage Dictionary and Electronic Thesaurus defines a resource (amongst others) as: "An available supply that can be drawn upon when needed." Burk and Horton (1988: 14) write: "A resource is something critical to achieving success and for which there is a real, potential or perceived shortage". Typical resources would be money/capital, people, equipment and supplies, land and buildings and energy. Information is placed alongside these by Burk and Horton. Identifying resources such as people and equipment is easy, but identifying the information resources of a business is not so easy as one could be dealing with something intangible. Context plays an important

role in identifying any resource, but specifically with the information resource. What may be an information resource to one business, may not be a resource to another (Burk *et al.*, 1988: 26).

The question is: Can a process be classified as a resource? Lee (1987: 4) argues that a process cannot be a resource - it is a way of *using* resources. A process is a series of actions and steps and is usually applied to change something (a resource) into something else (a product). Tested against Burk and Horton's definition above, a process would qualify as "...something critical to achieve success" but would fail the second part "...and for which there is a ...shortage". It is difficult to see how processes can be in short supply, unless the absurd is considered such as no process being available to change air into gold. It can thus be concluded that a process cannot be classified as a resource.

The information resources can therefore be said to be the information products, information sources, information services, information technology and information systems. These are the resources which an individual or an organisation turn to when they needs information. It is important, though, to realise that these resources may not, in fact they will in all probability not, provide the answers to the information needs. They are, as the name says, still *resources* and they will have to be processed further in order to satisfy the needs. The process necessary for this transformation is the appropriation process where context and perspective are added. When this happens, data are transformed into information.

"Information Resources Management" therefore deals with the management of information resources and the management of the process of informing would, strictly speaking, have to be excluded from its ambit. The emphasis is on the resource side - the input side - and no reference is made in the term to the process dimension. IRM focuses on the management of the information sources, products, services, technology and systems. It does not focus on the process following the creation of the resources, that is, when appropriation and

the addition of context and perspective take place. It further ignores the importance of knowledge and where it fits into the picture and that the ultimate aim should be not the creation or even the management of the information resources, but in their application.

The term "managing information as a resource" is also sometimes use in popular literature and language. It seems as if it is often used by businesses when they become aware of the importance of information and as a response, then want to manage information as a resource (Development Bank of Southern Africa, 1989: 4). The phrase "managing information as a resource" exhibits the same limitation as IRM, namely that the management of information is limited to the management of the resource dimension only. IRM and this phrase are therefore treated as synonyms for the purposes of this study.

4.3.2 Information management

Marchand (in Broadbent, 1984: 216) writes that the management of the information process has to do with "...how well the members of the organisation interact with the data resources and supporting technology for decision making and analytical purposes". Management of the other dimension of information management, namely, of data resources emphasises "...control of the physical manifestations of the organisation's information process". With reference to the views of Marchand, Broadbent (1984: 217) points out that the management of the data resources corresponds to the definition of information as a commodity while the management of the information process corresponds to the definition of information as a process of informing. This view supports the view of information-as-thing and information-as-process.

Woodman (1985: 98) describes information management (unscientifically, yet pragmatically) as: "...all about getting the right information, in the right form, to the right person, at the right cost, at the right time, in the right place, to take the right action". The *National Telecommunications and Information Administration* (in Drake, 1982: 227) has the same idea: "Information

management not only deals with the need of individuals and organizations to convert data into information but it also deals with the problem of getting the right information to the right people at the right time and in the right form". These definitions highlight an important aspect, namely the information process in contrast to the definitions of IRM which focus on the resource side.

White (1985: 21) gives a "working definition" of information management as: "The efficient and effective coordination of information from internal and external sources". Arvel (in Levitan, 1982: 236) says that information management involves: "...the administration of all corporate information, of all manual and automated data, and of all methods used for the communication, manipulation and presentation of information used in the course of doing business". Wilkinson (1987: 275) writes: "...we can define information management as being concerned with the effective use of information in organisations".

Drake (1982: 227) writes that information management "focuses on the information needs of individuals and the delivery of a product to fulfil those needs". Again, the idea of a process is evident.

Levitan (1982: 227) enthusiastically states that information management "...can be viewed as the keystone of information science and technology". She then describes its activities as information systems design and development, document and knowledge representation, database organisation and the storage, retrieval, dissemination and marketing of information. Information management can be considered as a logical enhancement of management information systems (MIS), "... but goes beyond MIS to provide techniques for planning, budgeting, staffing, organizing, and directing the full spectrum of information resources in an organization" (Levitan, 1982: 228). Despite the promising statements she made at the start, it seems that, essentially, she limits information management to the management of information systems.

Cronin (1985: viii) writes the following on attempts to define information management: "There are as many definitions of information management as there are supporters of the concept. This is only to be expected. Definitions of information abound; definitions of management are many and varied. Put the two together and one has a recipe for terminological confusion". In an earlier article, Cronin (1984: 115) writes: "Information management is a chameleon term. [It requires] ...a willingness to apply an integrated or holistic approach to the management of an organisation's total information need."

Lewis (1986: 244), once a leading authority in Britain on the subject, apparently agrees with Cronin and Bailey when he writes about defining information management: "I believe there is no clear-cut and unambiguous definition". He then offers the following description: "IM [Information management] is the integrative management of a broad range of information/data/library, human, financial and technological resources, for the satisfaction of user need, in pursuit of improved effectiveness, increased profits, better services". Bailey (1984: 246), writing on information management after attending a conference on the topic, says: "To try and define 'information management' is to put it in a straight-jacket".

White (1985: 29) uses the term "information management" rather than "information resource management" because he feels that "the concept of a resource is implicit in management". He writes that he usually uses the term "information resource management" when he is talking to data processing professionals, "...who increasingly are adopting the title of Information Manager in an attempt to show their function in a better light". He notes that he would rather refer to them as Data Resource Managers instead of Information Resource Managers. This rather snub remark points to a real phenomenon, namely, that information management and IRM are very often just information technology management and information systems management in disguise. Sometimes the disguise is not even present.

Lundeberg (1995: 83) defines information management as a field as "...about persons' use of information technology in business processes". This definition limits information management severely by specifying "person", information technology" and "business processes".

The important themes coming through in most of the above definitions are the management of the "process" (Bryce, Marchand), "focusing on the needs" (Drake) and "satisfaction of user needs" (Lewis). These definitions therefore go wider than just management of the information resources. The focus is on the satisfying of information needs and this is done through a process and not by focusing on the resources side only. Satisfying information needs means management of the input, output and process, all integrated into a system.

The input side of the system is the tangible information resources (people, products, systems and services) whereas the output side is knowledge and information (intangible). The process is the transformation of the resources into products and takes place through appropriation, interpretation and adding context and perspective to the information resources.

It needs to be recognised at this point that the process is facilitated through the use of information technology, but also through libraries and even radio and television. These form the infrastructure or environment supporting the process. They must, of course, also be managed and forms part of the holistic view of information management. It is, however, extremely important to realise that information management is not the same as information technology management, information systems management or library management. The management of these entities is important in their own right and all are components of information management, but it must be understood that management of these entities alone will not result in information being managed. They are necessary for successful information management, but not sufficient.

4.3.3 Information management defined

Defining information management is not easily done. As was pointed out in chapter 2, definitions of information abound. Variations in the definitions of management are fewer but one can expect that the two terms put together will produce a fair number of variations, as confirmed by Cronin. The definitions of information management generally all boil down to the process of allocating the inputs (that is, resources) of an organisation by planning, organising, directing and controlling for the purpose of producing outputs desired by its customers so that the organisation's objectives are accomplished (Thierauf and Reynolds, 1982: 7).

It is clear from the definitions that information management is concerned with satisfying the need for information; be it an individual, a business or a nation. This is achieved through effective and efficient management of the information resources, but also of the equally important information process and the associated infrastructure. *Information management is defined as the cost-effective management of the information process, the information resources and the information infrastructure in pursuit of predetermined goals* . It can be seen from this definition that information management is seen as being wider and more-encompassing than, for instance, the definition proposed by Lundeberg (1995). Information management cannot be limited to an individual, technology and business.

Three important concepts are mentioned in this definition: Information resources, process and goals. The *resources* are the information products, services, systems and sources. The goals are the goals (e.g. of the business) and in order to achieve those goals, each individual must be equipped to contribute meaningfully. This contribution takes place through the use of *knowledge*. The *process* is therefore the transformation of information resources into knowledge. Whereas IRM focuses on the input side, information management, as defined here, focuses on the entire system: Input, process and output.

It must be stressed that information management does not end with the provision of information. It ends with that information to be transformed into knowledge but, equally importantly, for that knowledge to be applied to achieve a goal, that is, resulting in some action. Unless information and, by implication, knowledge are goal directed, it cannot be said that information has been managed effectively. That is to say: Information management is not putting a report on a manager's desk, nor is it manipulating data with a computer.

This definition can be applied to both individuals, to businesses or on a national basis. It was shown in chapter 3 that people are dependent on information just in the same way as businesses and nations are. Hence, the definition is therefore applicable to an individual, a business or a state. In the cases of a business and a state, the information resources must be optimally utilised so that the business goals and objectives are achieved. The aim of information management in a business sense is therefore to apply and utilise all the information resources at the disposal of the business so that the business objectives are achieved.

4.3.4 The management of information

Lastly, a crucial distinction must be made between information management and the management of information. In any organisation employees are allowed the use of resources within a certain policy and procedural framework. As such they then become responsible and accountable for their utilisation of the assigned resources. The responsibility to manage such resources is their's and no one else's, ie. a personal responsibility. The resources could be human resources, financial resources, equipment and material or information resources. The management of resources can therefore be said in the first instance to be the responsibility of each employee allowed the use of such resources. In terms of the information resources, the management thereof would be the responsibility of each employee using information.

Having said that, it is necessary in most organisations to have a central function for the facilitation and coordination of resources management. As such a human resources function (managed by the Human Resources Manager), a financial (resources) function (managed by the Financial Manager) and other functions are found in most organisations. The responsibility of the human resources manager is to formulate human resources policies and to ensure that they are applied, the recruitment and appointment functions, staff induction functions and so on. The financial manager has a policy formulating and coordinating role to play with regards to the financial resources of the organisation. Of course, the human resources manager and financial resources manager both have personal responsibilities for the management of the resources allocated to themselves, but, in addition to that, they also have an enterprise wide facilitating and coordinating function to fulfil. Resource management, therefore, is essentially providing a framework to the organisation for the effective and efficient decentralised management of resources.

Likewise, information management in an organisation is the responsibility of a certain individual or of a certain post. However, every single worker, from the lowest operator to the most senior manager has the task to utilise those information resources made available to him - the management of information. It is the task of a specific post, or posts singled out for this function, to facilitate the information process from start to finish, that is, someone in the organisation is assigned the responsibility to see to the effective and efficient utilisation of information by others. Information management is, therefore, a centralised responsibility whereas the management of information is a decentralised responsibility. Information management provides the framework for the management of information to happen.

Unless these responsibilities is understood, accepted and applied, there is little hope of successful information management or management of information.

4.4 The evolution of information management

Cronin (1984: 115) contends that information management is a result of the activities of the US Commission on Federal Paperwork although he admits that information management is not a new discipline. White (1985: 21) disagrees with people claiming that the birth of information management took place on the day on which the Paperwork Reduction Act was entered in the statute books of the USA in December 1980. This act was the result of many years' work by the Commission on Federal Paperwork, established in 1974. In 1977 the final report was published and concluded that "...the heavy burden of paperwork imposed on corporations and individuals by the Federal Government was attributable to a failure to recognise information as an asset and to manage it effectively" (White, 1985: 26).)

According to White (1985: 21), the information management concept is "...at least two thousand years old" but started off as "military intelligence". Vickers (1984: 246) seems to agree with this view: "The need for information management has always been there, long before computers arrived on the scene". To White (1985: 21), information management is the efficient and effective coordination of information from internal and external sources, and, according to him, military commanders have been doing that for centuries. "Most battles have been won not by brute strength of sheer technological superiority, but rather by the careful analysis of the strength and weaknesses of the enemy" (White, 1985: 21). He quotes several examples where effective use of information made a difference between defeat and victory. He concludes that information management is not new and that it is not a "...direct consequence of the 'information economy'" (White, 1985: 22). It is something all people do, some consciously and some without realising it.

Marchand and Kresslein (1988: 396) point out that the evolution of information management was "...dramatically different from the evolution of personnel or financial management". The personnel and financial management functions were not subject to the technological forces that served as external stimuli to

shape the thinking and adapting of information management. As technology in the communication and information areas is constantly changing, the "...tools and strategies of information management are in constant transition, and they play a major role in influencing the objectives, scope, and organizational significance of the information management function" (Marchand and Kresslein, 1988: 396).

Marchand and Kresslein (1988: 402 - 404) identify four stages in the evolution of the information management function in the USA and more particularly in the Federal Government and its agencies. These phases are:

- *Stage 1: Physical control of Information.* This stage began "in the late 19th century and lasted until the late 1950's" (Marchand and Kresslein, 1988: 405). The basic technologies utilised were paper, the typewriter, filing cabinets, etc., while the strategic objective was procedural and physical efficiency. The management approach in this phase was paperwork management, records management, correspondence management, office design and layout and was carried out mainly by supervisory and lower middle management on a fragmented and loosely coordinated basis.

- *Stage 2: Management of Automated Technology.* This stage lasted from the 1960's to the mid-1970's and was characterised by the use of 2nd and 3rd generation computers, word processors, electronic duplicating machines, mostly "Technology searching for uses" (Marchand and Kresslein, 1988: 403). Strategic objectives during this phase were technical efficiency and control with the management approach being the emergence of centralised data processing departments, telecommunications managers and duplicating caters. The management was carried out mostly by middle management and was fragmented, uncoordinated and with the perception that manual management of information was different from automated management of information. A gap appeared between the users and suppliers of information technology.

- *Stage 3: Information Resources Management*. This stage lasted from the mid-1970's to the 1980's. During this phase technologies such as computer, telecommunications and office automation which were up to then developing separately, were beginning to converge. This convergence resulted in the strategic objectives becoming the integration of the information technologies and the view that information had to be treated as a strategic resource. The technologies utilised during this stage were distributed data processing, voice/data networks, multi-function workstations and personal computing with desktop and portable computers. The management function shifted to higher levels up to the lower senior management and entailed the application of traditional resource management principles to the information resource and the linkage between business planning and information resource planning (Marchand and Kresslein, 1988: 403).

  It was also during this phase that the report of the Commission on Federal Paperwork appeared (1977) and also the Paperwork Reduction Act (1980). The Commission which functioned from 1975 to 1977 "moved beyond the traditional emphasis of study commissions and legislative committees that heretofore had studied federal paperwork management" and "...for the first time, placed primary emphasis on the information within the document" (Marchand and Kresslein 1988: 409).

  The work done by the Commission and the Paperwork Reduction Act culminated in the issuance of its policy circular on the management of federal information resources by the Office of the Management and Budget (OMB) in 1985.

- *Stage 4: Knowledge Management*. This stage is anticipated by Marchand and Kresslein to happen in the 1990's. The technologies utilised will be expert or knowledge based systems, decision support systems and office intelligence systems with the precipitating forces being the increased dependence upon information technology making inroads into operational

and managerial decision making at all levels. They envisage that managing knowledge resources becoming a "...basic part of general management philosophy ...adopted by all levels of management" (Marchand and Kresslein, 1988: 404).

Looking at conferences to track the evolution of information management, as early as 1966 a conference was held at Lehigh University in the USA with the title "Information management in Engineering Education" (White, 1985: 27). The proceedings of this conference showed a remarkable understanding of information management as it was seen later on. The first conference on information management in the United Kingdom took place in London in 1979. Although more than eighty delegates attended it, the next significant event in the UK only took place in 1982 with the event of the Information Technology Year (White, 1985: 31). Lewis (1986: 244) reported in 1986 that the following had taken place in Western Europe:

- The development of a curriculum at the European Institute of Information Management in Luxembourgh;

- The formation of a body called WERTID - the Western European Round Table on Information and Documentation - to which representatives from Belgium, the Federal Republic of Germany, France, the United Kingdom and the Netherlands belong.

He lists numerous activities in the USA and the UK indicating that the management of information was attracting a lot of attention and progressing to the point where University degrees were offered on a masters level (Lewis, 1986: 244 - 245).

Broadbent (1984: 217) contends that the management of information evolved from the coalescence of four interrelated factors, namely:

- the growing awareness and recognition of the importance of information to the individual and to the organisation;
- improved accessibility to the information resources of governments;
- the attempts, particularly by government to reduce paperwork; and
- the availability and convergence of information handling technologies.

Attempts over the past decade to professionalise information management have taken place with the emergence of numerous professional organisations (Levitan, 1982: 233). These organisations originated from the disciplines of information science, data processing and archives and records management. Levitan (1982: 233) lists the following associations in the USA dealing directly with information resources management:

- Associated Information Managers (AIM);
- Association for Federal Information Resources Management (AFFIRM);
- Association for Systems Management (ASM);
- Association of records Managers and Administrators, Inc. (ARMA);
- Society for Management Information Systems (SMIS).

A number of other organisations deal with IRM indirectly (e.g. Datamation). In addition, a number of journals appear with articles about the development of information management and IRM.

Information has been managed since the earliest days, even though perhaps not purposefully and consciously. The development of information technology provided a tool to mankind with which he could harness more and more data. Thus was born the concept of "processing data" and turning it into "information" by using information technology. This "information" was nothing more than data summarised and processed, but it was not yet information as it is defined in this study. Nevertheless, this emphasis on "information" and the ability of machines to manipulate information gave rise

to IRM and information management and, indeed, to the concepts of the information economy and the information society. Information management is a by-product and a consequence of the information society. As the importance of information grew, the need to manage information was a logical consequence.

4.5 Characteristics of information management

4.5.1 The dimensions of information management

Cronin (1984: 115) identifies two dimensions for information management, namely, the management of the information process and the management of the data resources used by the organisation. Marchand (in Broadbent, 1984: 216) agrees with this view. The management of the data resources of an organisation is but one of the dimensions of information management; the other dimension being the management of the information process.

White (1985: 34) identifies three "components" of information management, namely:

- information resources, or the identification, assessment and use of internal and external resources;
- technology, or the methods of creating, storing, retrieving and distributing information; and
- management, involving strategic planning, human resource management, interpersonal communication, accounting, budgeting and marketing.

In chapter 2 it was shown that information itself has two main dimensions, namely, the resource dimension and the process dimension. The resource dimension included both tangible and intangible information (information-as-thing and information-as-knowledge). Information management would therefore logically also have these two dimensions, in line with the above

viewpoints. The concept of IRM would not be able to include the process dimension as shown earlier on.

It must be realised that information management starts off with the data resource. This then gets transformed into information resources through a process of data manipulation. This first process can be done by either human or machine or, as it is mostly done, through a combination of the two. The next process is the transformation of the information resources into information and knowledge. This process involves only a human and is done through interpretation, appropriation of the information resources and by putting them into context and by adding perspective. These two processes do not take place in a vacuum but are strongly facilitated by the use of information technology, systems and libraries or archives, but also through training and education which add to a person's experience and knowledge. This infrastructure or environment is also integral to information management but it cannot be seen as another dimension. White, in the first definition, acknowledges the technology as a component rather than a dimension.

It can be concluded that information management has two dimensions: The resource dimension and the process dimension. The management of both these dimensions is facilitated by an information infrastructure; a supporting environment without which information management cannot take place.

4.5.2 Objectives of information management

Marchand (in Broadbent, 1984: 217) says that the aim of information management is: "...to promote individual (or group) effectiveness by enhancing the capabilities of the individual (or group) to cope with the demands of its internal and external environments in dynamic as well as stable conditions".

Drake (1982: 229) writes that the function of managing information is: "...to support the organization and its staff in achieving corporate goals". She

suggests that the effectiveness of the information management effort can be evaluated by measuring the satisfaction level of the users.

Based on the work done by The Diebold Group, Inc., Levitan (1982: 237) lists the following as objectives for IRM:

- To establish an environment where only relevant information flows into corporate decisions. It should be noted that this objective clearly states that only the *relevant* information should flow into the decisions and not all information. Too much information leads to information overflow. This view implies a distinct selection process when collecting information;

- To establish and practice techniques whereby the cost of creating and collecting information can be compared with the benefits derived from its use;

- To effect changes in attitudes, policies and practices reflecting that information is viewed as a major asset of the organisation;

- To acquire information technology only after requirements have been analysed;

- To legitimize the role of the information manager;

- To prepare managers and workers for the implementation of the IRM program by providing training and education programs and career enhancements;

- To give users responsibility for their information production activities by including them in systems design, by charging them for the services they receive and by making them responsible for staff, facilities and other resources;

- To identify research and development opportunities aimed at improving ways in which information resources can be utilised to improve corporate decision making;

- To fix accountability for the efficient and effective acquisition and utilisation of information resources and the disposal of excess resources;

- To take the corporate information needs in doing business into consideration, such as making decisions about marketing strategies, plant locations, etc.

It can be concluded that the main objective of information management is to support the achievement of goals by facilitating the processes of transforming data into information and information into useful knowledge in a cost-effective way. This objective implies that information needs must be carefully analysed, that information rather that data be provided and obtained, that information must be treated as another valuable resource with a cost attached to it, that, if warranted, the facilitation of the process should be done by a person specifically assigned to it and, most importantly, to ensure that knowledge gained in the process is applied in support of goals. The objective applies to an individual, a business or on a national basis.

What is also important to note is that information management is a means to an end and not an end in itself. The danger of becoming an end in itself has been evident for many years when one looks at how the information infrastructure, for example, information technology or libraries, has been managed. These services have often been elevated to a stand-alone level which was not always in support or in line with business goals. Information management must be one hundred percent in line with business goals as the definition states.

4.5.3 The benefits of information management

Jonscher (in White, 1985: 24) concludes that improvements in the way information is handled by organisations will have a greater impact upon productivity than better and new techniques in manufacturing. In a survey done by the Wall Street Journal/Europe among a European panel of Chief Executives (White, 1985: 24) 98 percent out of 200 respondents indicated that they regarded improving information management as one of their top priorities.

Vickers (1985c: 157) lists the following possible benefits:

- Management information systems can be designed better by being better matched to management's needs and being designed by utilising skills from the data processing as well as information science disciplines;
- Information from the organisation's "corporate memory" can be accessed faster;
- External information sources can be utilised more effectively and economically;
- The information systems of the organisation will become integrated and accessible through common channels and devices;
- The use of the organisation's resources: People, equipment and sources, will become cost-effective.

Drake (1982: 227) points out that information management involves converting data into information. She contends that this approach adds value in the following ways:

- The value of the information centre output increases. Some information centres, e.g. public libraries, only provides data and not information, but information management changes that;

- By providing information rather that data, the (opportunity) cost associated with diverting the user's time away from his primary task, is saved;

- Productivity is increased.

Bryce (1987: 89) writes that information resource management "focuses on enhancing productivity within a corporation by taking a comprehensive view of systems development". Lee (1987: 4), commenting on the article by Bryce, writes that IRM "goes beyond productivity as an information systems objective to include strategic considerations".

Lewis (1985: 16) refers to a study done in 1982 by Hayes and Erickson at the University of California. Their study showed that there was a distinct relationship between the profitability of a company and its investment in information services. Lewis also feels that managing information properly leads to increases in productivity. The meaning of information management according to Lewis (1986: 244) states that it is "...for the satisfaction of user need, in pursuit of improved effectiveness, increased profits, better services". It can be deduced from this argument that the benefits of managing information would be improved effectiveness, resulting in increased profits and, in general, improved services to the users of information.

The main benefits that may be derived from the proper management of information will be an increase in productivity of people and improvements in the quality of decisions made as well as improved cost-effectiveness. These benefits will, in general, result in an improvement in profitability of the profit-oriented organisation. However, productivity improvement can not and must not be the ultimate benefit neither to the business nor to the individual. The business' or individual's greatest benefit must be to cope with its environment, whatever the environment may turn out to be. By making use of available information resources, the business or individual should be in a much more advantageous position to survive and prosper than without it.

Another benefit has to be empowerment. Neither citizens nor workers can be empowered without giving them the necessary information. If a person's knowledge is expanded (by giving him the necessary information), that person is better equipped to deal with situations at hand, be they work related or otherwise. Such a person has become more "knowledgeable" than before. Decisions taken by such a person will be of a higher quality (assuming rational decision making) and his actions will be more focused, resulting in higher productivity. The catch, however, is to get the person to apply such knowledge. It must be understood that by simply providing someone with the necessary information resources so that knowledge can be gained, the process is not completed yet. Unless the knowledge is applied in support of a goal or to result in some desired action, all that happened was an increase in a person's knowledge with no real benefits. (It is conceivable, though, that the goal could have been simply to gain knowledge with no real action following, but even this is still in accordance with a pre-determined goal.)

Productivity is the ratio of useful outputs to available inputs (Marx *et al.*, 1991: 304). An increase in productivity is therefore nothing but a better utilisation of inputs (resources). Increased productivity is not limited to increased output by humans, it applies to the other resources such as financial and natural resources. The bottom-line benefit of information management is therefore the improved utilisation of all the other resources. This is why Cronin (1985b: 137) and Carlson (1980: 6) claim that information conserves other resources. The way it achieves that, is to add to a person's knowledge through the provision of relevant data.

Another benefit of proper information management is that it contributes directly to the profitability of a business. The cheaper and more efficiently information can be obtained by any business, the more profitable such business has to be as it lowers the overheads (Prendergast in Norton, 1994: 28). Information management focuses on cost-effectiveness in terms of the information resources, information processes and the information infrastructure and, if successfully implemented, costs must be lowered.

4.5.4 Principles of information management

Information management must rest on a firm basis in order to be applied successfully. Unless these "pillars" are in place, information management will not be possible, or it will take place in a haphazard and fragmented way.

Meltzer (1981: 152) contends that information management is based upon the following doctrines:

- Information is the ultimate management resource. If one accepts that management is essentially the making of decisions and that information is essential for making sound decisions, then it follows that information has to be a very valuable management resource, if not the *ultimate* management resource. Francis Bacon (in Meltzer, 1981: 152) already coined the phrase: "Knowledge is power" in 1597 and by stating that, he introduced the idea that information is important. Spencer (in Meltzer, 1981: 150) writes: "The ability to convert business information to sound judgement is distinctively human. Even that intuitive, gut-level, 'sixth sense' that we sometimes call 'a good head for business' is actually the ability to assimilate and analyze information so quickly as to seem unconscious" while Meltzer himself writes: "A manager maintains authority by demonstrating his ability to put information to work". Keller (in Meltzer, 1981: 152) sums it up: "Without question, information is the essence of effective management".

- Information is a personal, organisational and national resource. Meltzer (1981: 152) points to the value of information as demonstrated in the buying and selling of information in the marketplace.

- Information is a basic human need. Humans need information to survive, e.g. what food is safe to eat (Meltzer, 1981: 153).

These "doctrines" as Meltzer calls them, were extensively argued in chapters 2 and 3.

Based upon these doctrines, Meltzer (1981: 153) lists 15 principles of information management, as follows:

- Utilisation of information. The efforts in the acquisition, processing and distribution of information are wasted if the information is not used to its best advantage. The information workers should be allowed "...to use information in innovative ways" (Meltzer, 1981: 154). This agrees with the argument put forward in section 4.3.3 where is was argued that it is only when information (resources) are put to use by converting it into knowledge so as to achieve goals when information becomes truly important.

- Access to information. Access to information must be encouraged and the efforts in obtaining the information minimized. It should be a fundamental right for people to have access to information, as was argued in chapter 3 (section 3.6.3; an Information Bill of Rights).

- Safeguarding of information. The rights of individuals and of the organisation must be protected as related to the acquisition of the information. A distinction must be drawn between what is needed to be known and what is wanted to be known. The latter should only be provided within the context of privacy considerations.

- Centralisation and decentralisation of information. Meltzer feels that the information source should be brought as close to the user of the information as possible. He therefore prefers decentralisation.

  It is assumed here that Meltzer means the *use* of information must be decentralised and not necessarily the management of it. Whilst it is every person's responsibility to manage (and use) the information available to

him, proper information management also calls for a centralised management function from where the process is facilitated, planned, organised and so on; a point made earlier on.

Bringing information closer to the user of information is important. Not only does information enlighten a person, it also empowers him.

- Anticipating information. The needs for information should be anticipated rather than just reacted to. Specifically when time is of the essence, the needs should be anticipated, not only to provide the information but to know where to find it.

- Information format. The format in which the user wants the information is of vital importance. The format usually changes with the level of management under consideration. "Dumping of reams of computer printouts on managers' desks burdens the users with irrelevant information that hampers their jobs" (Meltzer, 1981: 155).

- Information and the manager's span of control. The use of information technology makes it possible for the manager to control a wider range of activities and more subordinates. This, in turn, improves communication resulting from a flatter organisation structure.

- Accepting information. There must be an open-mindedness towards new information; even if the new information contradicts prior decisions, opinions and beliefs.

- Information flow. Information must flow freely throughout the organisation and even to and from the outside. "Today all members must be aware of what is going on and how they should contribute to the overall goals of the company. Management must listen to the information provided by nonmanagement personnel, customers, and other groups outside the formal organization" (Meltzer, 1981: 155).

- Recognition of the information manager. It is necessary for the organisation to recognise the need for an information manager to manage the information management function. This manager "must be recognised as an integral part of the organisation" and he/she must have the support of top management.

- Information as an agent of change. Decisions are made on available information. As new information becomes available, the decision may be reinforced or possibly negated. New information on regulations and emerging or disappearing markets must therefore constantly be collected, analysed and distributed. Information can therefore assist in bringing about change in the sense that people's ideas about something may be changed thereby facilitating to break down resistance to change.

- Information and productivity. A workforce that is well informed is conducive to higher productivity levels.

- Information as a motivator. Making sure that workers are informed about what is expected by management, how the company does and about the mission and goals of the organisation, motivates them to achieve their set goals. Workers feel that they belong when fully informed and that helps to motivate them further.

- Information requires investments. In order to have up-to-date information, management must be willing to invest in capital and labour. Professional staff and state-of-the-art technology must be at hand to man and facilitate the information centre.

- Information requires management insight. "No matter how quantitative or clinical the information is, managers must still use their education, training, experience, and management insight to put information to work most effectively" (Meltzer, 1981: 156). Whilst managers use information

in their jobs, the information is useless without managers with vision and insight to put the information to its best use.

Meltzer (1981: 153) warns that these principles should not be seen as if they are "...cast in concrete; to be effective, they must be flexible and adaptive to the needs of managers. They are not offered as an exhaustive, all-encompassing dictum of management conduct, but a suggested list of sound management practices".

Lewis (1988: 37) lists nine, what he calls "propositions" for the management of information:

- Information must be viewed as a basic social, economic and industrial resource.
- The sole purpose of information systems (not limited to electronic form) is for the satisfaction of a user need.
- Information has a cost, a price and a value.
- Information is defined such as to embrace all the forms by which knowledge is transferred.
- Technology must be seen as only a tool.
- New developments do not necessarily replace existing systems and procedures, but lead to incremental advances.
- Appropriate standardisation is essential to continuing development.
- Effective information management leads to significant changes in the power structure in the organisation.

- The information intermediary has a finite, but sometimes a very long, life-span.

He argues for two basic principles to be taken into consideration, namely, strategic thinking and integration. Strategic thinking reflects the need to look at the organisation as a whole and integration points to the need to take a holistic view of the totality of information management to the whole organisation. If these requirements are met and the propositions accepted by the organisation, it usually leads to the appointment of a "Chief Information Officer", on the same organisational level as the Chief Financial Officer and reporting to the Chief Executive (Lewis, 1988: 37). Cronin (1984: 115) also stresses the need for "...a willingness [by information managers] to apply an integrated and holistic approach to the organisation's total information needs."

Marchand and Kresslein (1988: 412) contend that a strategy is required to build bridges between the "building blocks", or areas of responsibility of information resources management. These "building blocks" are, in fact, the information resources. He therefore argues for a holistic approach taking the entire spectrum of information resources into consideration.

The management of these areas have generally developed "...in a haphazard and uncoordinated manner" (Marchand and Kresslein, 1988: 412) and can be seen as "islands", lacking bridges between them. To build the bridges, the following principles have to be kept in mind:

- Information is an organisational resource. Information is not a free good, but costly and valued, to be shared where appropriate.

- Accountability in the use of information resources and technology must be clear and consistent.

- Business planning and information resource planning must be closely linked. This principle leads to two basic conditions, namely, that "...both

the visibility and credibility of the IRM function to be elevated to a level comparable with other resource management responsibilities" and that the IRM manager "...be involved in coordinating information resource planning with the basic plans" of the organisation (Marchand and Kresslein, 1988: 415).

- Integrated management of information technology is required. The focus should therefore be on the use and application of technology and not on the technology itself.

- Maximizing the quality, use and value of information in the organisation is a strategic objective.

Vickers (1985c: 152) lists the following, what he calls characteristics of information management:

- Information must be accepted as being a resource and should be managed like the other resources, such as money, manpower and material. This corresponds to the first principle of Meltzer.

- Someone must take responsibility for information management. This is a logical outflow from the first characteristic. Any resource needs proper management and if it is accepted that information is a resource, then it follows that it should be managed. This does not, however, mean that every organisation needs an information manager as such. Smaller organisations could combine this function with others but someone should have "...the responsibility and authority to manage the information resource, and they should be adequately trained to do this" (Vickers, 1985c: 153). The call for an information manager corresponds with that of Meltzer.

- Information management should at least entail planning and controlling of the use of information handling skills, information technology and information sources and stores.

  Vickers (1985c: 153) notes that information handling tasks today are "...scattered among information scientists, librarians, data processing personnel, systems designers, statisticians and records managers working in a variety of separate departments". He also points out that things have worsened with the introduction of cheap microcomputers.

- Expenditure on information systems and resources should be coordinated. Vickers (1985c: 154) contends that the information manager should control the budget for information management, but he acknowledges that organisations might find this difficult to accept.

- Information management entails keeping up to date on the latest developments, more specifically in the areas of technology and external information sources.

- Information flow within the organisation should be understood. The information manager must use methods for measuring and monitoring the flows within the organisation and evaluate their efficiency. Tools to do this are emerging (Vickers, 1985c: 154).

It can be said in conclusion that the principles on which information management is based, are as follows:

- Information is a special and very valuable management, organisational, personal and national resource. This statement can be made without any fear of contradiction because no human being, no organisation (profit-oriented or non-profit-oriented) and no state can survive without information. Being such a valuable resource, it follows logically that it must be managed properly.

- Organisations, having accepted the first principle, must assign responsibility within the organisation for the management of its information. This responsibility must, firstly, be the (centralised) planning, organising, leading and controlling of the data and information resources and the management of the process of transforming data and information resources into knowledge. Secondly, each worker must have the (decentralised) responsibility for the management of the information resources allocated to them within the centralised information management framework.

- Information management calls for an holistic approach; taking data and information resources, the information process as well as the information infrastructure into consideration and a fundamental understanding of where each one of these components fit into the overall information management scheme. Most importantly, the reason for and purpose of information management must be understood, namely, that data, information and knowledge all stand in support of an overarching achievement of a goal; regardless whether that goal is on a personal, organisational or national level.

- Information management takes cognisance of the fact that data have a cost and information a value. Hence, cost-effectiveness of the information management function is paramount.

4.6 Implementing information management

Once an organisation has accepted the principles of information management, it should be put into practice. To introduce information management effectively in an organisation, Vickers (1985c: 159) suggests that the following changes might have to take place :

- People's attitudes might have to change in terms of their views towards information and information systems. (The principles of marketing management will apply well in this regard);

- Systems and procedures might have to be changed;

- Information media might have to change;

- The organisation itself might have to change; especially its structure;

- Management might have to change.

Peterson (in Levitan, 1982: 239) recommends the following steps in introducing information management into an organisation:

- Establishing a management philosophy covering the objectives and utility of corporate information resources;

- Identification of all the functional groups that are involved in information processing;

- Determination of the interfaces and information flow between these groups;

- Preparation of a set of coordinated objectives for each group so as to eliminate unnecessary duplication, overlap and blocked communication;

- Ensuring the cost-effective functioning of each group by measuring performance.

The Diebold Group, Inc. (in Levitan, 1982: 240) recommends three approaches to effective information management implementation:

- Establishing of the IRM SWAT (Special Weapons and Tactics) team. This team would be interdisciplinary and would convene when major decisions regarding system upgrades or acquisitions, office automation or other information technology-related projects must be initiated;

- Directing the consciousness of top management to the electronic information environment;

- Selectively disseminating information for middle managers and key professionals.

Marchand and Kresslein (1988: 416) acknowledge that different organisations will implement information resource management differently as objectives, operations, the management style, current and projected uses and investment in information technology differ from company to company. The departure point, pace of implementation and the migration will also differ. They suggest six different scenarios as reasons for wanting to implement information resource management, as follows:

- Management wants information management. According to Marchand and Kresslein the management of many organisations realise the value of true information management. Many big-name companies "...are adopting information resources management as part of their competitive strategy" (Marchand and Kresslein, 1988: 416). Other companies, such as banks, are forced to do it as their businesses have become heavily dependant on information services for survival. In the US Federal Government, laws are forcing agencies to adopt information management.

- Proliferation and rising costs of information technology. Upwards spiralling costs of information technology, telecommunications and office automation sparked senior management to question the cost effectiveness of their investments and the appropriateness of Data Processing and of other business units.

- Office automation requires information resource management. The effective implementation of office automation "...requires an interdisciplinary expertise approach to the information management problems of the office" (Marchand and Kresslein, 1988: 417). Information resources management offers a means for introducing and using office automation.

- Distributed data processing begs information resource management. As end-users are asking for and accepting more responsibility for the use of computers in their organisational units "...a corresponding pressure emerges to redefine the responsibilities of the organization" (Marchand and Kresslein, 1988: 417). Information resources management offers a means to accomplish this.

- Introduce information management, but don't call it what it is. This can hardly be called a reason for information management, but may be a good strategy when contemplating the introduction of information management. Such an approach may be due to political or cultural aspects.

- Prestigious or authoritative groups are recommending information resource management. This can be called the "wait-and-see" approach. Some managers do not want to be on the "bleeding edge" of change and wait until it is clear which organisations are recommending the implementation and which organisations are accepting it. In other words, should prestigious consulting firms, such as the John Diebold Group, or Booz, Allen and Hamilton advocate information resource management, they might be prepared to implement it in their organisations (Marchand and Kresslein, 1988: 417).

Marchand and Kresslein (1988: 418) identify three distinct phases through which organisations as a general rule go through when implementing information resource management.

- Integration of information technology management responsibilities. Most organisations have more than one unit or department performing some aspect of information management, such as data processing, telecommunications, office automation as well as library services. Many times the planning, procurement and operations are not coordinated within the organisational structure and leads to fragmentation and no-one having overall responsibility for the information management problems.

  The first step usually involves the development of a charter and a strategic plan for the organisation regarding information resource management. The second step is a logical result of the first with the realigning of the organisational structure "...to identify and integrate responsibilities for IRM" (Marchand and Kresslein, 1988: 418). The next step will be for senior management to make the organisation aware of the information management idea.

- Emphasis on user support tools and needs. During this stage maximum advantage is taken of end user support tools in using information technology. The DP or MIS department is now actively assisting end users "...in getting easy and timely access to corporate data bases" (Marchand and Kresslein, 1988: 420).

  When this stage is reached, users have become convinced that information is a valuable corporate resource and are making increased demands to get access to computer resources within the organisation. This, in turn, places pressure on senior managers to develop plans for integrating information technology into the strategies of the organisation.

- Emphasis on information use and content. During the third phase users are made aware of the use and value of information "...in enhancing individual and organizational productivity" (Marchand and Kresslein, 1988: 421). This stage thus also introduces knowledge management where "...senior managers are concerned about developing and optimizing the

use of data and information in the organization to maximize productivity, and at least in the business sector, profitability and growth" (Marchand and Kresslein, 1988: 422).

In conclusion it can be said that the implementation of information management will vary from one organisation to the other, depending on the kind of organisation, its culture and its management style, but will in all probability include the following steps:

- Establishment of a management philosophy and policy for the organisation. This could be done by an interdisciplinary team.

- Identification of the functional units involved in information handling and determining the interfaces and flow of information between them. This may mean that the organisational structure must change to accommodate the information management department (in larger organisations).

- Preparation of objectives, systems and procedures for the different units, ensuring their cost-effective functioning and measuring their performance.

4.7 Factors constraining information management in organisations

Woodman (1985: 98) lists the following factors which constrain information management in most large organisations:

- People do not know what they need. Woodman observes that the more senior a person in a large organisation is, the less his/her information needs can be predicted. They only know what information they need once a certain set of circumstances arose and then they "want specific information instantly" (Woodman, 1985: 98).

The typical reaction to this need is to store every element of data that may be relevant to the organisation, but the costs makes this an unviable option.

- Information is not readily accessible. Data and information sources are not stored in one physical form. It can be on paper, microfilm, magnetic tape or disk, optical disk, or even in people's heads. To complicate this, it is also held in different degrees of updatedness, with differing accuracy, with differing degrees of secrecy and communicated in different languages (Woodman, 1985: 98). Data are increasingly being kept in machine-readable form and computers are linked by means of national and local networks, but often lack of standardisation proves to be a problem even though data are in machine-readable form.

  In order to obtain the right information for the user, this lack of order and discipline mean that "people have to depend on human memory and ingenuity to pull together all the relevant elements of raw data" (Woodman, 1985: 98).

- Misinterpretation of information. To get an idea (information, knowledge) from one person to the next, language is needed. As was pointed out in chapter 3, language can quite often be ambiguous, even more so when information resources are produced by means of a computer where it lacks context. In conversation, context can usually be resolved (through a hermeneutic process), but not always in the case of written reports or books.

  Woodman (1985: 99) points out that "pseudo-officialdom" occurs where people who receive computer printouts tend to believe the information just because it was produced by computer. With the advent of the personal computer, it became possible for everyone to produce such an official-looking report.

- Information "overload". The computer and the photocopier are excellent producers of paper. Woodman (1985: 99) tells of a large organisation which found that 40 copies were made of each piece of paper by workers, "of which 15 were kept indefinitely". Another organisation calculated that it "printed 500 sheets of paper per employee per day" (Woodman, 1985: 99).

  It is an open question how much notice people take of all these pages of photocopies and printouts and what the true costs of producing, filing, and retrieving are. The manpower needed to undertake these actions of creating, storing, moving, reading, indexing and disposing it, is seldom known to organisations (Woodman, 1985: 100).

- Politics and power. As pointed out in chapter two, possessing the right information can put someone in a more powerful position relative to others. It is not uncommon for people to guard this kind of information jealously. People become used to the flow of information in the organisation and each one earns his place by having certain information. This establishes the "pecking order". Breaking open these niches of information is "one of the most difficult jobs" (Woodman, 1985: 100).

  This issue was dealt with extensively in chapter 3 (information and power and information and organisational politics).

- Organisational inertia. When it is needed to change the information flow in the organisation, it is necessary to make people see something beneficial to them for the change to be successful. People normally experience change as uncomfortable and it is therefore a prerequisite to a change of the information flow that the people involved recognise the need for the change.

  Woodman (1985: 100) notes that it is often the data processing department who might have this organisational inertia. Systems

professionals might tend to prefer the design techniques they have acquired earlier on rather than taking advantage of the state-of-the-art information technologies.

- Ownership is often ambiguous. The right of ownership is often ambiguous when information is shared between many departments and especially if the information is held in a computer. Each user claims exclusively the right to update it, create it and the right to decide who else might be allowed access to it. Conflict might arise if these ambiguities are not resolved.

  Systems designers face the danger of compromising in such a situation. This compromise usually depends on the politics, power and organisational inertia. This "...extends information management beyond the association of logic and data to include organisational behaviour as well" and "...is unlikely to be in the best interest of the organisation as a whole" (Woodman, 1985: 101).

- Information "float". Information "float" is "...the time-lag between an event occurring and the information that it has occurred reaching the person who needs to know about it in order to take some action" (Woodman, 1985: 101). The smaller the "float" the better informed the organisation.

  Telecommunication networks, using satellite technology, has a radical impact on organisations by drastically reducing the "float".

- Legislation and external pressures. Privacy legislation is in various stages of introduction in various countries as a result of an increasing awareness on the part of individuals and organisations on their rights. Transborder data flow is also receiving attention. Countries, such as Canada and the Scandinavian countries, are thinking of taxing data similar to goods when

it passes over their borders. This prevents the free flow of information across national borders (Woodman, 1985: 101).

- Information value is intangible. Although it is possible to determine the value of information in a quantitative way, information also has a intangible value. Often this intangible value is far greater than the quantifiable value. Unless a quantified business case can be presented to management, business leaders find it hard to invest in information management.

- Cognitive styles of users. "Individual people have different preferences for the form in which information is presented" (Woodman, 1985: 102). Some prefer text, some graphs, some pictures, some numerical analyses, etc. The information systems, whether computerised or otherwise, seldom make provision for each and every preference. This leads to a constraint from achieving ideal information management.

Marchand and Kresslein (1988: 428) also warn that the introduction of information resource management into the organisation will, like the introduction of any new management strategy, most probably encounter constraints. They list the following interdependent and overlapping constraints:

- Conceptual constraints. Two ideas about information might be encountered. The first is that information is not manageable because of its (partly) intangible nature. The counter argument is that management have always been trying to manage at least the tangible information resources for many years. Also, when financial and human resources management were introduced at first, it encountered the same misgivings (Marchand and Kresslein, 1988: 429).

  The second argument is that information resource management will lead to information manipulation and excessive control with the resulting

stifling of creativity and even the threat to the privacy rights of the individual. The counter argument is that the current situation is more likely to cause this than an attempt to manage information as a resource. Proper information management must prevent abuse. They acknowledge that misuse may occur even with information resource management in place as it depends on the values and perspectives of the people advocating the change. "The real problem is trying to balance these inherent risks in managing information with the benefits. Information resource management as a management strategy does not ignore or try to overlook the risks, nor does it overstate the benefits" (Marchand and Kresslein, 1988: 430).

- Methodological constraints. This constraint is usually found in the government circles. Government executives need information to formulate policies and operate service programs and argue that the value of this information cannot be measured in economic terms.

  The counter argument is that information resources management acknowledges the importance of applying non-economic criteria in placing a value on information. Information resource management at least provides the opportunity to apply cost criteria to the evaluation of information and represents a better alternative to the "free good" approach. Marchand and Kresslein (1988: 431) acknowledge that, whilst tools for accurate valuation of information use are very limited, this does not warrant to completely discard the management of information.

- Political constraints. Because information provides people with a power base, people may not want to give up the current information handling procedures and thus corroding their power base. "Data processing personnel, for example, may regard IRM as a threat to the existing ways of operating computing facilities..." (Marchand and Kresslein, 1988: 431).

- Structural and functional constraints. Information resources management as a management discipline is still in its infancy and will therefore be in "constant flux" (Marchand and Kresslein, 1988: 431). The organisation should move forward carefully and well-planned.

- Legal constraints. In some countries laws control the management and use of information resources. This could limit the organisation in its use of information (Marchand and Kresslein, 1988: 431 - 432).

- Fiscal constraints. One of the objectives of information management is to bring the information technology costs under control, but implementing information management may need financial resources. Where organisations have fiscal constraints, the implementation may be constrained (Marchand and Kresslein, 1988: 432).

- People constraints. It is natural that people might resist the change to information management. Implementing information management will in all probability mean that the job descriptions of certain posts will change. To some this will be a welcome change, but (like with most change processes) some people might resist such change (Marchand and Kresslein, 1988: 432 - 433).

It is clear that information management will not happen unless a conscious effort is put into making it happen. The question is: What is absolutely necessary to get right in order to succeed with information management? Marchand and Kresslein (1988: 433) list the following critical success factors for implementing information resources management:

- Understanding the business environment. Senior managers mostly do not have a good understanding of how the business is supported by the use of information resources. It is, however, of the utmost importance for these managers to be aware of and to fully understand how the information resources contribute to the success of the organisation as

well as to know of the opportunities for the improvement of the effectiveness and productivity of the organisation.

- Treat information resources management as a management issue and not a technical one. The emphasis should be on the management side of information and not only on the technical side. Marchand and Kresslein (1988: 433) warn that people, and particularly data processing people, should not see information resources management as just another term for data processing or MIS.

- Implementing information resource management requires a long term strategy. "Quick results" and technical fixes" should not be the only concern. Proper information resource management "...will require long-term strategies of organizational adjustment, coupled with short-term milestones for dealing with pressing information problems or technological decisions" (Marchand and Kresslein, 1988: 434).

- Information resource management strategies should be attuned to the political, economic, and management concerns of the organisation's leadership. "Since IRM is by definition a top-down approach to information management, its introduction and implementation ...requires sensitivity to the ...political culture, fiscal condition, and management style" (Marchand and Kresslein, 1988: 434).

- Information resources management must be implemented incrementally and not all at once. It is unrealistic to address and resolve issues in all the affected areas at once. Marchand and Kresslein (1988: 434) suggest a phased approach, based on the priorities within the organisation. Although different organisations may have the same objectives for information resources management, the sequencing of their action steps may differ.

- Implementation requires early attention to the administrative changes that may be needed. People may have to be moved and retrained or new people may have to be hired. All these steps take time and have to be completed before new tasks can be assumed (Marchand and Kresslein, 1988: 435).

- Implementation requires consistency in executive leadership. The implementation of information resource management can take from three to five years, frequent changes in the executive leadership will probably result in inconsistent behaviour in objectives and plans. During these years it is therefore important for the executive team to be consistent and stable (Marchand and Kresslein, 1988: 435).

Introducing and implementing information management in organisation or national context is not going to happen easily. Many factors contribute to prevent it from happening and pitfalls are plenty. The mere fact that one is dealing with something which could be very intangible such as knowledge, makes it difficult to get top management to "buy in" or, even more so, to allocate financial resources to it.

In order to have any chance of success or a degree of success, it is essential to treat information management as a management issue and not as a technical one. The fact that it is supported by an infrastructure consisting of, amongst others, information technology, is incidental and so is the fact that, in many cases, the idea of information management would come from the information technology side of the organisation. These facts do not make it a technical issue. Information management is a business issue and should never be allowed to be high-jacked by information technologists or librarians for the sake of those disciplines.

4.8 The consequences of the mismanagement of information

It appears that information management with respect to organisations and on a national level is necessary. This leads to the question of what happens if information is not properly managed? Are there any grave consequences if we carry on like we have been doing for many centuries? Horton (1979: 47) offers the following consequences as the result of the failure of an organisation "...to treat data and information formally as a manageable resource":

- People higher up in the organisation constantly "burden" the workers lower down the organisation with excessive demands for information;
- The cost of handling information and paper-work increases to the frustration of top management, the board and the stockholders;
- Because requirements for data are not coordinated between divisions and departments, duplication and overlap results;
- The credibility of the organisation is questioned by stockholders and customers because similar facts are collected by different departments and divisions and information issued by these departments and divisions is not always consistent;
- The formal and informal communications channels of the organisation are clogged by irrelevant data which cannot be separated;
- Poor information leads to poor decisions with the result that the organisation assumes unnecessary risks and loses opportunity;

Vickers (1984: 246) agrees with Horton and notes that without proper information management the danger exists that information systems become compartmentalised. He proves his point by quoting several examples where this has happened in organisations.

It is true that we have been managing businesses for centuries without any form of formal information management. During that time thousands of businesses have been very successful. Governments have successfully led many nations without it. Yet, it would seem that the situation is changing. During the late nineteen-seventies the United States realised that their "paperwork" was getting totally out of control. This led to the Paperwork Reduction Bill (1980) in an attempt to rationalise the hundreds of data bases being created and duplicated and the burden the state was putting on its citizens. This was a direct attempt to manage information.

On the business front, decision makers are confronted with situations where they need information from many and varied sources so as to effectively take such decisions. "Act globally" has become the catchword. Businesses are "outsmarting" each other through creative and innovative ways of utilising information available to most. Gone are the days where only a little information is needed to manage not only the big corporations, but also the smaller, more specialised business. The "cottage" industry, if it should ever become a factor, will need information about the market, the players and the competition in order to survive. Rising costs of uncontrolled use of information and paper will force organisations to take a second look at how they utilise information.

Information cannot be left to itself any longer. It needs to be managed as a valuable resource and process.

4.9 The practice of information management

A lot is being said and written about information management. The question, however, remains: Is it being practised?

White (1985: 34) feels that real information management is not yet widely accepted and practised in the United Kingdom and writes: "The majority of UK executives seem still to live in a land where 'information management' is the

combination of an IBM PC and Lotus 1-2-3!". Vickers (1984: 245) writes the following on definitions of information management: "...it would be more true to say that several kinds of information management have arrived at the same time. A certain amount of confusion reigns as various professional groups try to attract favour for their own particular brand of IM. The librarians and the information scientists, the information technologists, the computer experts and the record managers - all have their own views".

It is interesting to note how books having the title "Information Management" or "Information Resources Management" vary in their contents. The book by Hussain and Hussain (1984: ix - xiii) has the title *"Information Resources Management"*, but contains detailed discussions of computer resources, their acquisition, system development, etc. A book with the title *"Information Management: The strategic dimension"* edited by Earl (1988: vii - viii) concerns itself with six sections, each describing an aspect of information technology management. One can conclude that, in their opinion, the management of information technology is equivalent to information resource management. Many other books show the same tendency. Some devote the entire book to information technology matters while others have most of the book devoted to it.

The tendency of writers to equate the management of information technology with information management must be seen as a severe limitation to the concept of information management. Information resource management, or information management for short, has to do with the management of all of the information resources and, whilst it is acknowledged that information technology plays a major part in information management, it is definitely not limited to information technology alone.

The term "information management" is often misused. White (1985: 27) quotes the example where advertisements for computer systems analysts and programmers were placed under the banner of information management in the 1984 "Sunday Times". Horton (1979: 49) seems to agree with this and warns

that information management is not the same as information manipulation. He writes that people might view information management as "... a return to the Orwellian 'big brain' idea" whereby people are manipulated as a result of information which is held on individuals by "Big Brother". He lists the following as not being information management:

- Theft of information (bugging of telephones and offices);
- Distortion of information;
- Fabrication of information (forging);
- Misuse of information;
- Misrepresentation of information (lies);
- Concealment of information ("hush" money);
- Suppression of information (keeping the lid on investigations) (Horton, 1979: 49).

Judging from the literature, one feels that the concept is often not understood in the terms it was defined in this work. Talk to someone from the computer industry and most will understand the term to mean the management of information technology. Talk to a librarian and he would probably understand it to be the management of a library. On the practical side, it is therefore difficult to make a judgement as to the state of information management. An educated guess would be that information management is not practised as is proposed in this thesis.

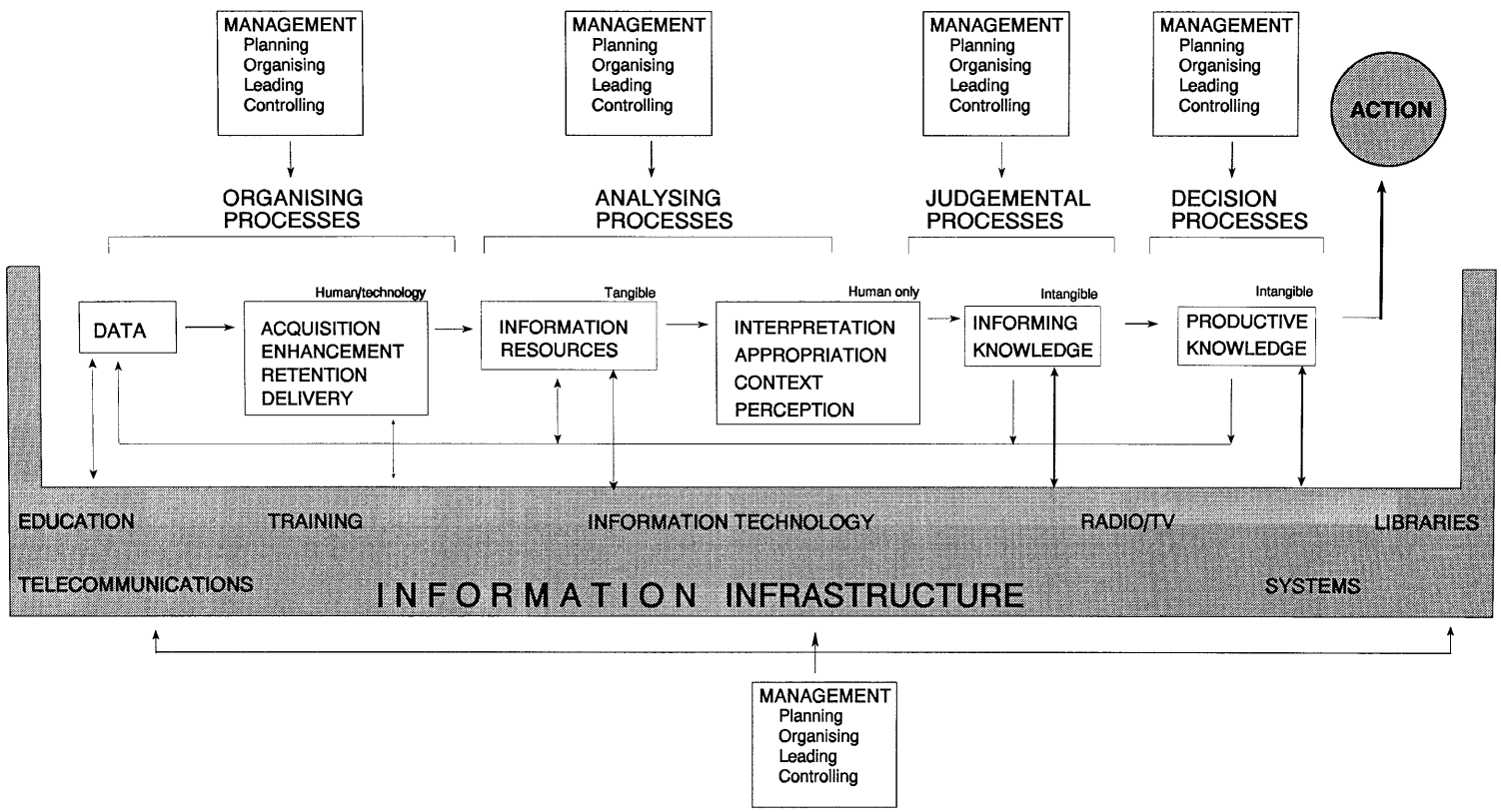
4.10 A model for information management

Having defined information management and its characteristics, a model can be built to show the relationships between the different components of the system. This is diagrammatically shown in figure 4.1.

The process starts off with data as the primary input. Data can be anything the senses perceive: Figures or words on a piece of paper, a painting, a piano recital or pain when touching a hot stove. Data are transformed into

Figure 4.1

THE INFORMATION MANAGEMENT MODEL



information resources (information-as-thing) through a process. This process can be summarised as acquisition, enhancement, retention and delivery. These steps do not all have to be present, but it still remains a process. This process furthermore can be done through technological means, for instance, a computer program to summarise raw data into logically grouped data. The end result can be called an information resource. This is not information yet: Data must first be put into context and perspective - meaning must be added - before it becomes information and that always involves the human mind. Structured data are not information, as we are reminded by Boland (1987: 371).

Information resources are information products, services, sources, information technology and information systems. People are also seen as information resources because they are the "carriers" of knowledge and information in intangible form. In terms of the model, information technology and information systems have been made part of the information infrastructure rather than information resources. The reason for that is that these are information resources used to manipulate data; information *handling* or *processing* resources, in other words.

These information resources become input for the next process, namely the process of transforming the information resources into information. This takes place through interpretation and appropriation of data from the information resources and the addition of context and perspective. This second process can only be done by a human as only a human being can add meaning. No machine can do this, although it is acknowledged that a machine, as part of the infrastructure, can make it easier for the human to perform the process. The product at the output side is information in the mind of a human. Should this information be added to the human's existing knowledge, like adding pieces of a puzzle, knowledge is created.

Up to this point the processes have not added any value except, perhaps, by adding to a person's knowledge. This kind of knowledge is called "informing" knowledge by Taylor (1986: 6). Should such a person apply the knowledge

gained in the process towards some goal, either personal, business or nationally directed, value is being added in a general sense. Taylor calls this "productive" knowledge. The ultimate aim of information management is to apply the basic resource, data, to attain some goal or to cause some action.

The knowledge gained by a person (intangible) may also be transformed back into data or as an information resource (tangible). The process is therefore reversible, but also iterative. An example of such reversal would be a person writing a book or an article. The knowledge in his head in its intangible form, is thereby transformed into an information resource in a tangible form. This resource could then become input for a second person thereby to be transformed into information or knowledge for the second person. Transforming knowledge into data is also possible: To a person seeing another person running down the stairs instead of using the elevator, may be totally meaningless. Such a person recognises that the person is running down the stairs, thereby acknowledging the fact that he is doing so, but because it has no meaning to him, it remains data. The person doing the running, on the other hand, may be doing so because he knows (i.e. he has the knowledge) that there is a fire in the building and that using the stairs would be risking the elevator getting stuck.

This transformation of knowledge into information and data is a very important concept for, *inter alia,* information systems development, as pointed out by Dahlbom and Mathiassen (1993: 29 *et seq.*) Describing a manual process or practice in writing means transforming knowledge into information and information into data, but it is not always easy: "We have no idea how we do a lot of things that we know how to do" (Dahlbom and Mathiassen, 1993: 33). Be it as it may, the model clearly shows the forward transformation and the reversal.

It is important to realise that these processes do not take place in a vacuum. An environment or infrastructure is needed to support the processes. This environment consists of information technology and systems (including

telecommunications technology), libraries (a store for information sources such as books and services) and education and training. The latter two add to a person's knowledge base. This environment is integral to the process, but from a supporting point of view.

Where does management come into the picture? Management is necessary for the two processes, but also for the infrastructure and for the resources. In practice this means that the management of, for instance, information technology, is necessary and important, but the aim is to facilitate and not to dominate. The aim is to achieve the goal through the application of the knowledge in the person's mind. This shows why management of a library or information technology, or the management of information systems development cannot be equated with information management. Management of these functions focuses on a component of information management and even though management of these functions is *necessary*, it is not *sufficient* for information management.

Management of the first process - acquisition, enhancement, etc. - is usually not too difficult, provided that the needed data are readily available. Data are transformed in this process into some product or service, therefore something tangible (product) or measurable (service). However, the second process, the human process of appropriation, is far more difficult. How does one manage the process of knowledge creation?

Firstly, the organisation needs to realise and acknowledge that knowledge is a valuable asset - accepting the concept of human or intellectual capital. Secondly, acknowledging it means that it must be treated like any other asset of the organisation, taking the differences into consideration. "Managing know-how is not like managing cash or buildings, yet intellectual investments need to be treated every bit as painstakingly" (Stewart, 1991: 43). Once the intellectual assets have been identified, the intellectual needs need to be matched with the organisation's strategic plans. If the marketplace is changing and there is a need for other skills and knowledge, it must be found. It is of

paramount importance that the knowledge present in any company is mobilised and not just present. It needs to be put in action. "intellectual capital is useless unless it moves. It is no good having some guy who is very wise and sits alone in a room" (Macdonald in Stewart, 1991: 60).

Information Resources Management (IRM), in terms of the definition earlier on in this chapter, can clearly be seen in the model as only a subset of the total model. It covers the management of the first process (transformation of data into information resources) and the management of the information infrastructure. Information management, on the other hand, looks at the total picture and concerns itself with the important matter of how the information resources are being utilised to achieve some goal. Unless the information resources are being used meaningfully, very little of value, if anything, has been achieved.

It is also important to see from the model that the first process as well as the information infrastructure are the high cost elements in the model. Acquiring and manipulating data into information resources invariably has a significant cost implication. The second process involves the human mind and even thought time can also be measured in monetary terms, such cost will in all probability be less than the cost involved in the first process. The real value, on the other hand, lies definitely on the output side, namely, when the knowledge gained by the individual is applied to some goal. It follows therefore, that, should the process not be followed through until the goal stage, little value is gained and what is more, it is gained at great cost.

Analysis of figure 4.1 shows why effective management of information technology or information systems, or even IRM, would not be considered successful information management. If information is to be managed successfully, the entire model must be taken into account and not only parts of it. The infrastructure (technology, systems, training, education etc.) must most certainly be in place as a necessary condition, but the process, data and

information resources and the achievement of goals must also be managed. Failure to recognise this, would mean failing to manage information.

The information management model is applicable to both the individual and organisation (business or otherwise). In the case of the individual the processes and management are less formal and the resources are fewer than in the case of organisations. Even in the case of organisations, the extent of the processes and resources will vary greatly, depending on the nature of the organisation and its size. Nevertheless, the model is generically applicable.

The model takes into consideration what was chosen in chapter 1 as a point of departure with respect to society and social change. The radical humanistic paradigm was chosen as the most appropriate. The model certainly treats the human as prominent; in fact, as the most prominent component of all. Subjectivity is evident throughout the model. Even though machines can assist in the process, machines are not absolutely essential. It is the human who enables and who makes it happen.

The model is also radical to a large degree. Ever since the industrial age the perception grew that machines could take over from the human. For decades it was believed that machines could be produced that would render the human almost useless and unnecessary. The model contradicts that proposition in a radical way. It proposes exactly the opposite, namely, that only humans can make information management happen. Implementing information management the way the model proposes means that the human must once again be recognised as the main cog - as the driving force of the organisation. The model acknowledges that machines can play a supportive role, but it also shows that they can never be more than just that.

The model is also radical in the sense that it calls for elements of the business to be managed holistically. It calls for an end to fragmentation, yet for empowerment of the people. It calls for a view of information that spans the entire organisation and means that barriers that exist between business units,

such as the library and computer departments, be broken down. This is not going to be easy for obvious reasons.

The information management model therefore fits well into the radical humanistic paradigm.

4.11 Conclusion

The term "Information Management" (IM) has become part of the business vocabulary. Another term, "Information Resources Management" (IRM) made its appearance for a while and then fell into disuse, having been surpassed by the shorter "Information Management". The implication locked in the concept is clear, namely, that information (or at least, the information resources) ought to be managed.

Although the two terms are often used synonymously, careful analysis show differences between them. IRM has a strong reference to the resource side and apparently ignores the process side. It could be implied by the term that information must either be managed as a resource, or that information is a resource, or both. The fact that it *should* be managed as a resource, still does not necessarily mean that is *has* to be resource. In fact, it could indicate that, even though it is *not* a resource, it *should* be managed as one.

The term "Information Management" on the other hand does not have the implication of a information being a resource, but it does not exclude it either. It therefore allows for a wider interpretation, obviously including the resource concept. It encompasses IRM. IRM is therefore a subset of information management.

It was argued in this chapter that IRM means the management of the information resources. These resources are herein defined as the information products, information sources, information systems and information services. The necessary information infrastructure usually needed to transform data into

information resources, would be included in the definition of information resources. The fact that one is dealing with resources, implies that one is dealing with the input side of a system.

Information Management, on the other hand, is argued to go beyond the input side and includes the process and output side of the whole system. Information was shown to have essentially two dimensions, a resource dimension and a process dimension. IM includes both these dimensions. Information management, therefore, is defined as the cost-effective management of the information process, the information resources and the information infrastructure in pursuit of predetermined goals. It is clear from this definition that the input side (the resource), the process and the output side (predetermined goals) are all included. This is done on purpose: IM is a holistic concept and should definitely not be watered down to anything less.

Another subtle differentiation should be made between the terms "Information Management" and "the management of information". The difference lies in responsibilities. In organisational terms each and every worker dealing with information in some form or the other, has the responsibility to manage the information at his disposal, that is, decentralised. This is called "the management of information". However, the responsibility for information policy, coordination of the information function and so on, is a centralised one. This is Information Management. This difference is not unique to information, the same applies to human resources and financial resources.

The need to manage information was felt in all probability soon after the invention of the first printing press, but this need got heightened with the advent of computer technology and photocopying machines proliferating the workplace. It started off as records management in the 1950's and continued through the years until the situation got so bad that legislation was passed in the USA in order to reduce (federal) paperwork. Even though the obvious need to manage information was expressed, the "how to" remained elusive, perhaps even until today.

Information management has the objective to enable the attainment of goals, be that a personal goal, a business goal or a national goal. It achieves that by facilitating the process of transforming data into information and information into knowledge so that the knowledge thus gained will be put to work. If this can be achieved, the potential benefits are clear: Empowerment through knowledge, increased productivity and profitability and, in general terms, the better utilisation of other resources. The area to look at when trying to measure the effects of information management has to be the quality of decisions. Data, information and knowledge are all essential inputs into the decision making process and, assuming rational decision making, the higher the quality of the information, the higher the quality of the decisions.

Information management is based on a few principles. The first principle to accept is that information is a special and valuable management, organisational, personal and national resource. Secondly, an organisation must assign responsibility to someone for the planning, organising, leading and controlling of its data and information resources and the process of transformation. Thirdly, information management must be approached in a holistic way. For too long have we tried to manage information in a fragmented way by having computer resources managed on its own, the library function on its own, allowing each person to acquire, enhance, retain and deliver information products and services with no central coordination and with no framework.

Implementation of information management in organisational terms will depend on the type of business, but it will probably have to include the establishment of a function within the organisation to take responsibility for information management, the establishment of an information management philosophy and policy, the division of responsibilities and the preparation for objectives, systems and procedures. It must be realised that implementation is not always going to be easy. Certain factors may hamper implementation such as a poor understanding of the business environment and how information contributes to the successes of the business, treating information management as a technical issue rather than a management one, expecting quick fixes, ignoring the

organisational culture and leadership and trying to implement everything at once.

At least from a theoretical perspective it would seem that it is important to manage information - the reason being that information is a vital resource and process to business. The question is: How will one know that one is not managing information properly or, conversely, how will one know that one is managing it properly? Both questions are equally difficult to answer as proper information management cannot be related directly to any business performance indicator. Although it must obviously contribute to the success or the failure of a business, in most cases it cannot be singled out as the one and only contributor.

The result of not managing information can readily be identified though. A chronic demand for information from higher echelons of the business on the lower levels is indicative of information not being managed. Equally bad is when different facts are being given by different divisions of the business (in all probability because of duplication of data and systems). Another indication is the constant increasing cost of paperwork without increased output in terms of revenue or profits.

It is difficult to establish whether information management, as defined in this study, is practised by individuals, business and government. It can be assumed that information is being managed to a certain degree by individuals in their daily lives and as workers and managers in their working lives. The question, however, is: Are they managing information in the "information management" sense or in the "management of information" sense? There can be no doubt that we are all managing the information resources at our disposal to the best of our abilities. We are therefore reasonably successful in our ability to manage information. But does information management take place?

For the individual it would not be feasible or necessary to practise information management in his daily live in the formal sense. But, as it was proposed in

this study, it is necessary for organisations to practise information management. The problem is: How do we know when information management is being practised successfully? Where do we measure it? It is doubtful though that information management is practised as proposed in this thesis. It may be done partly through information infrastructure management and through the management of information, but information management in the true sense of the word, is unlikely. Why is that? One reason may be that people do not know how to do it. The literature is also not very helpful as much confusion reigns. There is no general agreement yet as to what information management really is or should be. As long as this confusion exists, it will be difficult to either prove or disprove that information is being managed. A common understanding and definition is needed and only then can one proceed to the next step.

It is proposed in this thesis that information management means the management of the information resources, the information process and the information infrastructure. The process starts off with raw, unevaluated facts and ends with knowledge being applied to some predetermined goal. This process is enabled though the use of an information infrastructure such as computers, radio and TV or libraries and the use of humans to transfer information into knowledge. Management is needed at various stages of the process, but also for the overall process. Proper information management means management of the entire process and not only parts of it in a fragmented way. As long as we continue to compartmentalise information into disjunct pockets of information and to manage the infrastructure separately, we will not be able to claim that we are managing information.

In this chapter information management and the related activity of the management of information were explored and defined. It is now clear what is meant by these terms. In the next chapter one last issue needs to be addressed, namely, whether the principles of (general) management can be applied to information. Only if this issue is resolved can there be clarity regarding the manageability of information.