

CHAPTER 5

5. THE MANAGEMENT PROCESS APPLIED TO INFORMATION

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5.1 Introduction

In chapter 4 information management as a concept was explored. After evaluating different definitions, information management was defined as the management of the information process, the information resources and the information infrastructure in pursuit of predetermined goals. The definition highlights three aspects which need to be managed: The information process, the information resources and the information infrastructure.

But what do we mean by "to be managed"? Once management has been defined, it is necessary to apply it to the information process, information resources and information infrastructure so as to find an answer to the question of whether information can be managed according to the accepted principles of management.

The model for information management as proposed in chapter 4 will be taken as a point of departure and this model will be tested against the management steps. The model basically looks at the resources, the infrastructure and two processes. It will be attempted to apply each step in the management process to the data, information, knowledge and infrastructural resources as well as to the process of transforming data into information resources and transforming information resources into knowledge.

Over and above applying the management process to the information management model, the applicability of the process on an individual, a business and on a national level will be explored. The business level is the one which will be concentrated on mostly seeing that this is the level where it has the widest application.

5.2 The management process

In "classical" terms, management means planning, organising, leading and controlling. This is also referred to as the command-and-control model of

management. More recently another model has emerged. This was partly due to the successes of the Japanese management approach and by an increased awareness of human rights and dignity and a stronger focus on information, knowledge and information technology. This model is called the empowerment model (Tromp, 1993: 34).

Tromp (1993: 56) proposes a collaborative approach to management based on the empowerment model. He identifies six management functions: Leading, curating, facilitating, building, integrating and interfacing. In his description of leading, one can identify the planning, organising, staffing and decision making steps. Curating is described as caring, mentoring and tutoring, counselling, informing and provision of resources. Facilitating focuses on group functioning. Building means working in teams, performance management, reward systems and recognition. Integrating means integration of the individual and groups and interfacing provides the link between subordinates and the outside world (Tromp, 1993: 57 *et seq.*).

Even though the collaborative approach is significantly different from the classical command-and-control model in that the emphasis and classification are different, the same steps (actions or activities) are involved. For the purpose of this study it is therefore not necessary to compare the different management models with one another. It is acknowledged that one model may lend itself better to the information management concept than the other, but the purpose of this chapter is to determine whether the management steps (called functions by Tromp) can be applied to information.

If information is to be managed the four steps (planning, leading, organising and control) must in some way or other apply to information. Not only must they apply to the resource dimension, but also to the process dimension.

It was indicated that the management of the information infrastructure forms an integral part of information management. The four steps must therefore also apply to these elements.

5.2.1 Planning

5.2.1.1 Introduction

Any management system must pay attention to the planning process. Sikula and McKenna (1984: 130) write: "The efficient utilization of organizational resources - human, capital and technological - does not just happen without the continual estimation of future requirements and the development of systematic strategies designed toward goal accomplishment". Planning is the process of deciding what action is going to be taken in the future (Horton, 1979: 123). "Without planning there is no control..." (Gannon, 1982: 57). Ackoff (1970: 1) writes: "Planning is the design of a desired future and of effective ways of bringing it about". There is a distinct difference between planning and forecasting: Forecasting does not normally make any attempts to influence the future whereas planning actively tries to do that. Planning is the logical first step in the management process.

Planning usually involves four activities:

- Determining the mission of the organisation (Gannon, 1982: 57). Griffin (1987: 107) adds purpose, values, environment and experience to this.
- Determining long-term goals and short-term objectives in light of the mission;
- Developing strategies and tactics to achieve the goals and objectives;
- Implementing policies, procedures and rules in accordance with the missions, goals and objectives; and
- Updating plans in light of changing circumstances.

When the planning process is applied to information management it leads to the following:

- Defining the information purpose, mission and vision statements in line with those of the business or country.
- Formulating an information policy The policy must address the entire life cycle of information; from data to knowledge as well as the information infrastructure. The Diebold Group (in Marchand and Horton, 1986: 195) suggests that the following be addressed in an information policy:
 - strategic issues (how information relate to business goals, new products and new markets),
 - functional issues (role of information in support of business functions such as marketing, inventory control, etc),
 - privacy and confidentiality issues and fair practices (need to know) and
 - technical and procedural issues.
- Linking of the information plans with business plans. Of specific importance here is the planning of information requirements. The objective is to have the right information at the right time, in the right form... but the trap to avoid is to collect data indiscriminately. More information does not mean better information and, apart from that, costs will probably prohibit this.

5.2.1.2 Planning applied to information management

Planning is a crucial step in the management of information as this is where a future situation is defined. If the vision of the future is mundane and without

ambition, there is little hope of achieving the objectives of information management. On the other hand, the plans must be realistic, taking into consideration the needs and resources available to satisfy those needs. Going back to the model for information management, planning must be done in terms of the data, information, knowledge and infrastructural resources identified in the model. The requirements of an organisation in terms of knowledge resources are satisfied through the specialist skills and knowledge vested in human resources. Planning for the resources is therefore a straightforward process and should not present any difficulties.

Meltzer (1981: 79) suggests a five step approach, namely, a scanning of the information industry for products and services and specifically the trends, an assessment of the information needs of the organisation and the prioritising of these needs, the determination of a strategy so as to satisfy the needs, a critical evaluation of the information resources already available within the organisation and, lastly, review and updating of the plans. Stewart (1991) agrees with this view. The ever-changing marketplace must be examined continuously and the necessary skills be employed to cater for these changing needs.

Planning must also be done for the two processes proposed in the model. The first process - transforming data into information resources - means in terms of planning, that the acquisition, enhancement, retention and delivery of information resources must be planned for. To plan for the second process - transforming information resources into knowledge - is more difficult as the process takes place inside the human mind. For this to happen successfully, an environment conducive for learning to take place, is necessary. For creativity to develop and prosper, it is necessary to have an environment where ideas can freely emerge and flow. This calls for a non-conforming environment where humour is present, curiousness and risk taking is appreciated, the atmosphere is relaxed and management is democratic (Van Loggerenberg, 1989: 242 *et seq.*, Hudson, 1993: 147 *et seq.*). Such an environment will not happen automatically, it has to be planned. It may not

always be easy to have this kind of environment present in a highly competitive, fast moving business situation, but even if this is the case, some parts of the organisation (e.g. research), may lend themselves more to such an environment than others.

Unfortunately, even with such an environment present, there will still not be a guarantee that information resources will always be transformed into knowledge. Even if it does happen, application of such acquired knowledge into business goals, may still not happen - informing knowledge transformed into productive knowledge. It may help to design an appropriate reward or idea recognition scheme in a business environment so that bright ideas can be seen to be appreciated. The Kaizen approach which originated from Japanese businesses comes to mind.

Information planning also means having and living an appropriate mission and vision for the information management function. The objectives must be clear and also who the customers are. This is essential to ensure a focused approach.

5.2.1.3 Planning applied to the management of information

Every staff member in the organisation use information to perform his duties, regardless of the position in the hierarchy or the content of the post. Planning needs to be done in terms of what data or information resources will be needed in order to effectively and efficiently carry out his functions. Should training or education be required in terms of the use of information, such training or education must be planned and carried through.

The acquisition of data or information resources needed takes careful planning so as not to waste financial or other resources in the process. Data collection from external sources could be a costly exercise and should be done with responsibility. Should an information system or systems be needed to either store the data or perform manipulation on the data, such system, as part of the

infrastructure, should be planned with care and in cooperation with the information management function.

5.2.1.4 Planning applied to the individual, business, national and international levels

- The individual level

Planning of information management and the management of information on a personal and individual level outside the workplace, is a very informal process. Intuitively each individual knows to a large degree what information he needs to survive and what he finds interesting and no formal planning is necessary to obtain it. Usually there is not a substantial investment or effort needed to satisfy such needs.

With the number of information resources - books, magazines and newspapers - ever increasing, a little more formal planning may be in order. The same applies to the different media on which these resources become available. Accessing bibliographic material through networks (perhaps on the information highway) or on CD-ROM may be more efficient than the traditional paper format.

- The business level

Planning in terms of information management and the management of information on the business level has been dealt with above. The entire information management model is applicable and so is the section on the management of information.

- The national level and international levels

Most of what applies to business would also be applicable on a national level as the government is but another form of organisation. The most

important aspect to be given attention to though, is the formulation of an information policy for the country. An Information Bill of Rights may also be necessary. The influence of information technology on the economy, social structures and culture needs to be planned and not left to follow its own course.

On an international level international organisations should play a major part in shaping the information realm. Such organisations should act as watchdogs with regards to the use and, more specifically, misuse of information. The "gap" between the information rich and the information poor and the consequences going with it, should be watched and corrective action taken where necessary. Privacy and confidentiality issues are important areas to be guarded and internationally accepted policies and standards should be developed for these areas.

5.2.1.5 Conclusion

Planning for information management and the management of information is not only possible, it is essential. Without proper planning in place, very little makes sense beyond that. Planning is the first, vital step in the management process. It must be realised, though, that planning is not an event that happens once a year. It is a continuous process as plans are brought in line with changing circumstances.

5.2.2 Organising

5.2.2.1 Introduction

For effective functioning, management must work within an organisational structure with a design which is compatible with the objectives and mission of the organisation (Gannon, 1982: 211). Whereas planning guides the organisation's activities to achieve the goals, organising is necessary to undertake these activities. It is a process consisting of the analysis of the

activities and resources, the grouping of similar activities, the allocation of resources and the determination of relationships between the activities and people (Marx *et al.*, 1991: 283).

Griffin (1987: 265 *et seq.*) lists 5 steps or building blocks to organisation (after the needs of the organisation have been determined). The first step is to acknowledge work specialisation, or the breaking down of work into smaller, component parts. Unless carried to extremes, this will contribute to productivity gains. The second is departmentalisation or the grouping of jobs into manageable units. This can be done by function (e.g. marketing, production, finance), by product (e.g. 3-series, 5-series and 7-series BMW's), by location (eg Europe Division, Far East Division) or by type of customer (large accounts, agricultural sector). Other groupings may also be possible.

The third step is to allocate authority relationships. Each worker needs to know what his or her job entails, what authority he has and what the relationship is between his job and others in the organisation. The fourth step is to determine the span of control. Span is a function of manager competency, physical dispersion, the number of nonsupervisory duties, required interaction, standardised procedures, similarity of tasks, frequency of new problems, preferences of both supervisor and subordinates and the extent of technological aids.

The last step is to determine staff and line positions. Line positions generally work directly towards organisational goals whereas staff positions assist and advise.

5.2.2.2 Organising applied to information management

Horton (1979: 209) writes: "The form and structure of the information organization ...is absolutely crucial to the organization's goal achievement". He suggests that the following must be taken into account when designing a structure for information management:

- The nature of the business. In terms of information management, this question relates to the role of information *vis-a-vis* the role of the other resources of the organisation. This role will differ from the one organisation to the next. Also, the form and substance of data and information needed will differ from one to the other and will have an influence on the structure. Some organisations are far more dependent on accurate and timely information, for instance, the financial markets as opposed to a restaurant.
- Make vs. buy considerations. Some organisations are in a position to generate most of its own needed data and information, while some may have to rely on outside sources.
- The quality of available professional information human resources. Horton (1979: 210 - 211) makes the point that quite often, "...the key to an effective organizational structure lies in the strength, drive, foresight, and initiative of a few strategically placed individuals who have the stamina and power of their convictions". He points out that many organisations have this problem with their librarians traditionally being "poorly equipped by temperament and training to enter the ring with computer center chief to do battle for today's tight budget dollar." He continues to suggest that, where an organisation has someone strong, the organisation be built around that individual rather than the other way round. "Organizational placement and functional authority do indeed go a long way to helping establish new programs, but in the end people run programs" (Horton, 1979: 211).

Horton (1979: 203) observes that the information function can be located anywhere in the company and can still be effective, provided "...information resources policies are strong; top management becomes directly interested and involved in spelling out the company's information programs; and necessary financial and human resources are budgeted to support the information unit". He also contends that the information unit should be placed on the same

hierarchical level as the other resource management functions, such as financial, human resources and materials.

It was pointed out that the management of information is the responsibility of each person as opposed to information management which is the responsibility of an individual or unit in organisational context. The design of such a unit will now be investigated.

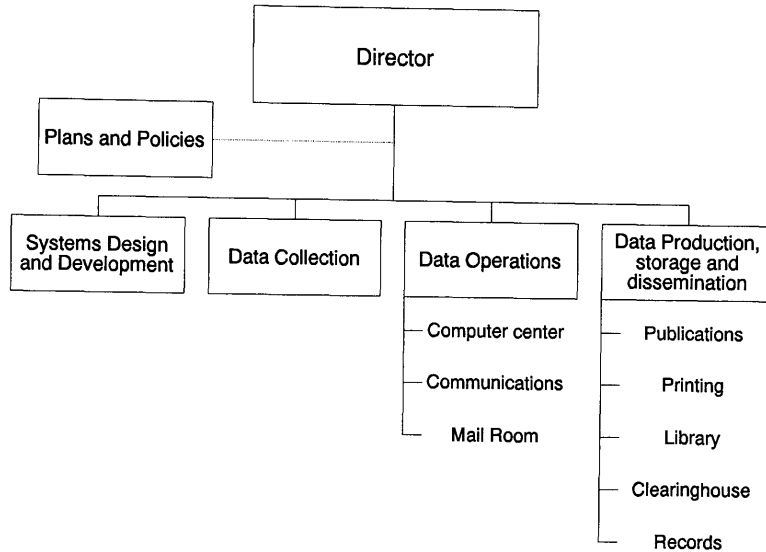
The design can be done using a functional approach, a conventional approach or a mixed approach (Horton, 1979: 203 - 209).

- **A functional approach**

The functional approach uses the end-service to be provided as a guide to the design. Such a design is illustrated in figure 5.1. This structure may be suitable for a typical Federal Government agency (USA), but Horton points out that this may not be the best structure for every organisation. He acknowledges that, for instance, librarians may feel uneasy being "lumped together" with clearinghouses and others. Other functions may have the same objection to this design. Horton (1979: 205) concludes that this method of designing the organisational structure is neither "pure" nor "preferred" and can even be misleading being based on the assumption that all the different functions can be accurately described and defined. He calls it "a simplistic approach".

Horton also writes that, with regard to the library function, the functional design might work better for "scholarly" institutions than for organisations having to do with process control. "Where the library is a crucial information resource, for example to scholarly pursuits, then we might well see the primary breaks for the information unit oriented to documents and literature, and not simply data" (Horton, 1979: 205). The role of the information resource must also be taken into account. In the airline and banking industries, up-to-the-second information has to be available for the survival and success of the

Figure 5.1
Functional Structure



Adapted from Horton, 1979: 204

organisation. The computer and communication network become crucial in such operations and may have to occupy a much more prominent role. In such organisations, the library might play a minor role (Horton, 1979: 205).

- **Conventional approach**

The more conventional approach to organisational design has the conventional activities, such as the library, computer centre, printing facility and mail room together as individual organisational units. The library has traditionally been an entity accountable directly to top management for the acquisition, storage, retrieval and dissemination of literature sources, while the computer centre was responsible for the data sources and development of information systems. Each one of these units had its own specialised way of information management although it was perhaps not called that (Horton, 1979: 206).

The convergence of computer, communications and other technologies, such as word processing, caused the boundaries between these organisational units to become blurred. This called for new approaches to organisational design

and companies trying to cling to the conventional way, have been experiencing problems (Horton, 1979: 206).

- **A mixed, transitional structure**

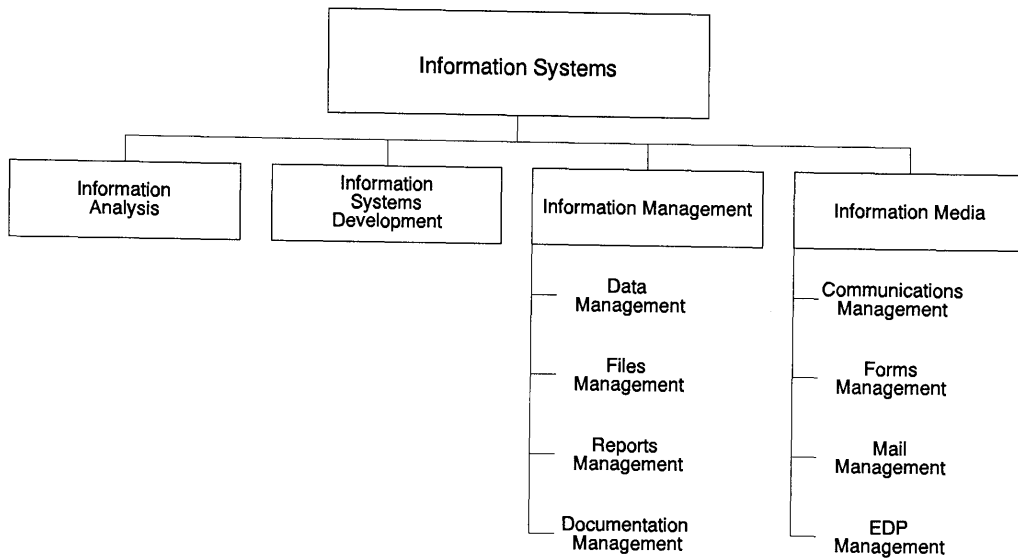
Horton (1979: 206) proposes an organisational design between the fully functional approach and the conventional approach and calls it a "mixed, transitional" structure (figure 5.2). In this structure, information storage and processing functions are partly consolidated across media and mode lines, while the collection and dissemination functions still follow the traditional approach. In the design of this structure, it is attempted to manage common-purpose data as far as possible. Information analysis and systems development functions were treated as higher-order activities for which different skills and a management systems were required. Inherent in this structure is the fact that its physical files and records are not separated from the data management function, nor is mail handling separated from communications (Horton, 1979: 209).

- **A new structure**

The organisational structures proposed by Horton do not seem to fit the information model very well. His "mixed transitional" structure has a number of out-dated concepts in the structure which may have been current at the time of writing, but have fallen into misuse. Data management today, as an example, certainly has a very different meaning than what it had in 1979. Taking the information management model to guide the design of the structure, it is easy to identify the functional elements of the information infrastructure as Information Technology, Information Systems, the Library and Documentation and some more may be added depending on the nature of the organisation.

Over and above the infrastructure one can identify the two processes of transformation from data to information resources and from information resources to knowledge. The information resources (products, services and

Figure 5.2
A Mixed, transitional structure



Adapted from Horton, 1979: 208

sources) must also be managed.

A structure is proposed in figure 5.3. This is certainly not the only possibility. In fact, the different functions do not even have to report to the Chief Information Officer (CIO) directly. It is quite conceivable to envisage a matrix structure where information technology, systems, the library and so on all report to different lines, but having dotted lines to the CIO to serve on information related teams, managed by the CIO.

The important point to stress is, firstly, the fixing of responsibility in a post and secondly, taking a holistic view so that all the information related activities in some way or the other can be managed by this post. The design of the structure is something that will depend on a number of variables within the organisation. These variables may differ so widely that a generic organisational structure would be rendered meaningless.

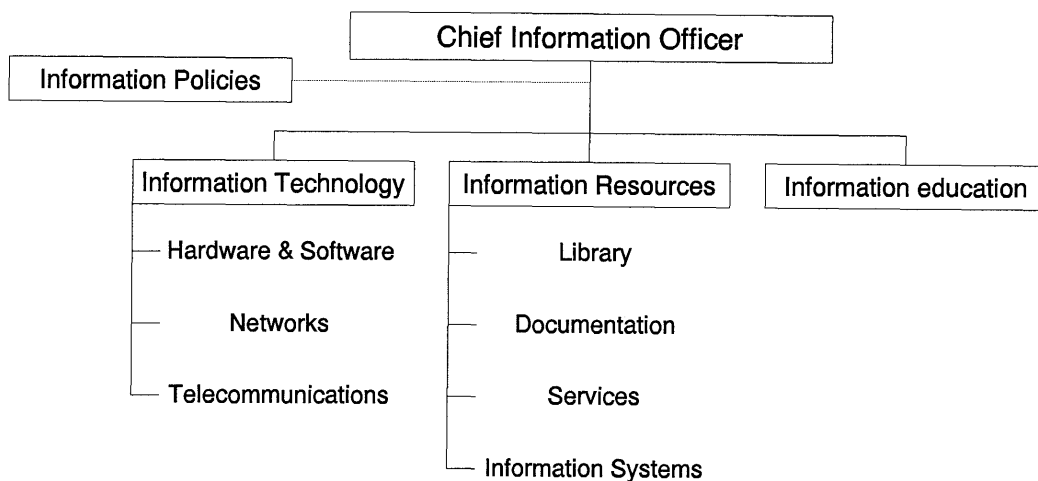
5.2.2.3 The Information Manager

To manage information in organisational context, a person must be given the responsibility. A name often found in the American literature for such a post is the Chief Information Officer (CIO). The term "Information Manager" will be used in this study, but synonymous to the CIO.

The Information Manager is the person responsible for facilitating and

Figure 5.3

A New Structure



coordinating the information management process in the organisation. He "concentrates on long term strategy and leaves the running of computer systems to technical experts" (Bock, 1986: 162). He is responsible for selecting, acquiring and deploying all computer and telecommunications technology, writes Bock. He must be able to view the organisation from the top down, he must understand its mission and objectives and must be "tuned in to the strategies articulated to implement these objectives and the policies put in place to achieve the organization's goals" (Brinberg).

Meltzer (1981: 122) writes that the Information Manager is the person responsible for the efficient acquisition, processing and utilisation of information resources so that the organisation can attain its goals. He has the all-encompassing responsibility for the information needs of the organisation. Meltzer is not drawing a clear distinction between information and the management of information. The role of the Information Manager is far more on facilitation than on actual "doing".

The Information Manager must have the following characteristics:

- He must be familiar with all aspects of the Information Industry. He must understand and be familiar with information technology (Meltzer, 1981). He must understand the needs of information users and must be willing to make the information user a hero (Brinberg).
- He must have the education and training of a manager and not of a specialist or technician (Meltzer, 1981). He must know technology but also business. He is "...more interested in what works than how it works" (Weiner in Bock, 1986: 161).
- He must be an organisational entrepreneur, working with the organisation and not for it. The interdivisional nature of information requires that the Information Manager must not be blocked by an arbitrary organisational structure (Meltzer, 1981). This emphasises the importance of taking a holistic view across the entire organisation.
- He must be sensitive to the organisational culture and ethics, public responsibility, attitudes towards the marketplace and integrity of its products and service (Brinberg). To this can be added the need to understand organisational politics and that information can be a base for power (chapter 3).

- He must be a marketer, offering service in stead of information. This means he must be a good communicator on all levels, inside and outside the organisation (Brinberg). He must have the ability to explain to business people how to make best use of technology while making technical staff understand what management wants (Bock, 1986: 162).

It is clear from the above that the Information Manager is a rather special breed of person with a background and understanding of many disciplines, ranging from the "hard" scientific world of computer technology to the very "soft" issues of education but also the social aspects of information technology and systems. Understanding of the business is also essential.

The Information Manager is not a technocrat, nor is he a bookworm. He is primarily a businessman with sensitivity to and understanding of the other issues.

5.2.2.4 Organising applied to the management of information

The management of information is an individual responsibility in organisational terms and no organising as such should be necessary. It may, however, be necessary for the individual in organisational sense to put some structure in place which will provide him with the needed information resources. Such a structure could be internally or externally to the organisation.

5.2.2.5 Organising applied to the individual, business, national and international levels

- The individual level

Organising does not apply to the individual level as no structure is needed on this level.

- The business level

What has been said above about information management and the Information Manager apply very definitely to business or any other organisation. Business is the area where it finds most application.

- The national and international levels

As is the case with business, some organisational structure on a national basis is necessary for the information management function. The responsibility will, however, be limited mostly to policy formulation and application matters with little or no attention being given to facilitation of the information management processes themselves. The national information resources may be necessary to address from a strategic point of view.

There would be no international structure as such although international organisations could perform such as function on an agency basis.

5.2.2.6 Conclusion

Organisation, as another step in the management process, can be applied very well with respect to the information resources and the process of informing. The design of the information management function will be determined by the organisation itself and its peculiarities and needs. "There is no ideal organisation", writes Meltzer (1981: 113). What is important in this design is that the structure must allow a holistic view of the organisation. Furthermore, the design should bear in mind that the purpose of information management is to facilitate a process and no elements of "doing on behalf of others" should be allowed.

Organisational culture will have a definite impact on information management and its success or failure. Organising for the management of the data, information, knowledge and infrastructural resources will not be difficult. Organising for the process of transforming data into information resources

through acquisition, enhancement, retention and delivery will also not be too difficult. However, organising for the process of transforming the information resources into knowledge and ensuring that the knowledge gained in the process is applied to the advantage of the organisation, is more challenging.

It was pointed out when dealing with the planning function that a certain environment will be conducive for knowledge creation and its application. This calls for a specific organisational culture to be present. Organising alone will not guarantee the desired culture. Leadership by the senior managers, *inter alia*, is needed for that.

The post heading up the information management function requires special attention. It calls for knowledge of many disciplines - library and information science, information technology, education and training, communication - and few people have knowledge of all these disciplines. Added to this is the requirement that intimate knowledge of the business is paramount. Meltzer contends that the information manager is an organisational entrepreneur, a provider and user of information, a policy maker, a change agent, a researcher and a resource mobiliser; "...a mover and shaker" (1981: 138 *et seq.*). The information manager has a very specific task, namely, to promote a culture in the organisation conducive for information to be treated as valuable and to be managed as such.

5.2.3 Leading

Leadership is about three concepts: Power, influence and authority. Power is the potential ability to affect others, influence is the ability to consciously or unconsciously exercise power and authority is power created by an organisation. Power can be obtained in five ways: It could be granted by the hierarchy (legitimate power), through the ability to give or withhold rewards (reward power), through the ability to punish (coercive power), through identification, imitation or charisma (referent power) or through information or

expertise (expert power). Leadership is the skilful use of power and leaders use this power to influence the behaviour of others (Griffin, 1987: 421 - 422).

The relationship between power and information has been pointed out in chapter 3. Expert power specifically has close and direct links with information. A person withholding or distorting information can strongly influence another person's behaviour. Griffin (1987: 424) points out that this way of exercising power is very dangerous. Firstly it is generally considered to be unethical, but secondly, when it is found out, it leads to distrust and a lack of confidence.

Groups and group behaviour form important components of leading. Groups can be functional (eg human resources department), task oriented (e.g., project team), informal or people having a common interest. Many reasons exist why people join informal groups, but one of specific importance is to obtain information. The "grapevine" is a very effective communication channel in any organisation (Griffin, 1987: 472). A communication channel, naturally, exists to enable information to flow.

Another component of leadership is communication and as was shown in chapter 3, it has close links with information. Communication is, in fact, the process of transmitting information from one person to another (Griffin, 1987: 487).

5.2.3.1 Leading applied to information management

The above proves that information plays a very important role in the leadership process. But how is leadership applied to information management? In this sense leadership means educating the organisation with regards to the role information plays in the organisation. In chapter 3 it was pointed out that people will not easily share information if that gives them a power base from where to operate. It is the task of the information manager to educate and

convince people that they have to share information in order for the business to be more successful. This requires a leadership role.

As information management has not really "taken off" in businesses, a strong element of leadership is going to be required to make it successful. Meltzer (1981: 138) claims rightfully that the information manager must be an organisational entrepreneur. He must be willing to walk a road that no-one has walked before him and, above all, he will have to have the courage to convince other managers, above and below him, of the benefits of information management. In this he will not only need courage, but also the will to persist (and perspire).

Alone and on his own he will not succeed - he will need the support and active involvement of other senior managers and especially the chief executive. Unless the chief executive and other senior managers commit themselves to the principles of information management, it is destined for failure. Paying lip-service only will also not work. Senior management must be seen to "walk the talk" and manage the information at their disposal. Setting an example is of paramount importance.

Strong leadership on the business, national and international levels is therefore crucial for information management to be successful. Such leadership will have to come from the information manager, but with strong support and involvement from senior management. Leadership does not apply to the management of information.

5.2.4 Controlling

5.2.4.1 Introduction

Control in organisational sense means regulating organisational activities so as to attain goal achievement (Griffin, 1987: 522). It is usually done in terms of the resources of the organisation, but it could focus on any activity or set of

activities. Information (in resource terms) therefore has a direct relationship to control. Control of resources means controlling inventory levels, controlling quality and controlling equipment and other infrastructural resources (such as office space).

Control of resources generally can happen at three points: At the input stage (preliminary control), the process stage (screening control) and the output stage (postaction control). In preliminary control, the quality and quantity is controlled before the resources become part of the process. Postaction control is generally not as useful as the other two types, yet it provides valuable information for future planning. A typical organisation would be making use of all three types of controls, depending on the nature of the business and the products.

The control process has four steps. The first step is the setting of standards. This forms the basis against which measurements will be made. The second step is to measure performance. The third is to compare the performance against the standard while the fourth step is to evaluate and taking the necessary action.

It is clear to see that planning and control are closely related. Planning sets goals and strategies to achieve those goals. Control makes sure that it happens. Planning and control should therefore be integrated. Control should furthermore be flexible to accommodate changing circumstances, it should be accurate, it should be timeous and it should be objective.

Griffin (1987: 536) points out that employees generally do not like control much. They seem to have a natural resistance to control. Reasons for this can be found in organisations tending to overcontrol, especially in terms of employee behaviour. It may also be focused inappropriately, thereby leaving no room for discretion. Depending on how it is used, control could lead to inefficiencies. Effective control means accountability, showing up poor performance and highlighting problems. Control systems should be designed

to minimise these resistances, for example by allowing employees to participate in planning and controlling.

5.2.4.2 Control applied to the information management model

Control is important in any business and regarding any resource or process. For information (as resource and as process) control has special meaning. It is not widely realised that data and information have significant costs associated with them - they are mostly being treated as free. With such a point of view as background, usage of such a free good mostly has big wastage as a consequence. Proper information management must change this perception as data, information and knowledge have large costs associated although such costs are usually hidden in overhead costs and therefore not clearly visible.

Control in terms of information management means that the data, information and knowledge resources must be controlled. As with any other resource, an oversupply in inventory is a waste. It must therefore be determined what data, information and knowledge resources are needed, when they are needed and at what cost they are going to be acquired or created. People have the tendency to collect all sorts of information resources "just in case" it is needed. This temptation must be resisted. Information resources must also not be obtained before they are actually needed. One of the characteristics of information is that it goes through a certain life cycle over time and as it progresses through the cycle, the value changes. Proper information management means that the information must be made available at the right time; not too early but not too late.

Controlling the processes of transforming data into information resources and information resources into knowledge ranges from simply controlling the acquisition of data and information resources to the more complex controlling of the creation of knowledge. Controlling a process taking place in the mind is impossible and, at best, the control should therefore lie somewhere else. The

control must lie on the resources flowing into the process (input) and the application of the knowledge gained (output).

It is clear from the above that a special relationship exists between control and information. On the one hand information is needed to control; without information control becomes impossible. On the other hand, information, seen as a resource or as a process, needs to be controlled. This leads to the argument that information about information is needed in order to control information.

In order to control more effectively, mechanisms have been devised over time. Three of these mechanisms are accounting, budgeting and auditing.

5.2.4.3 Information accounting

As was shown in chapter 2, information carries a cost with it. It is therefore possible to express it in terms of financial figures. Burk and Horton's (1988) information mapping technique suggests that an information inventory be built consisting of information resource entities (IRE's). They suggest that for each IRE, the cost of that IRE is determined. This cost must be reflected in the organisation's financial accounts.

This linking of the cost of an IRE to the chart of accounts may be problematic: Firstly, because of the fact that these costs are often hidden in overhead costs or, secondly, that one may take the existing accounts and fit them to the IRE's without making the necessary distinctions. For instance, the cost of a particular information system (an IRE) is not the same as "Data Processing costs" as typically found in a chart of accounts. If one is to undertake this exercise seriously, it may be necessary to create some new accounts. Even though it may be difficult, Burk and Horton plead that, if information is to be managed as a resource, the proper allocations of costs must be undertaken. Marchand and Horton (1986: 226) remark that the cost-identification process distinguishes

between internal costs and external purchases of information resources so that it is possible to allocate costs either as expenses or as assets.

Treating information as an asset rather than an expense forces the organisation to look at the value side rather than the cost side (Burk and Horton, 1988: 30). Marchand and Horton (1986: 208) show that it is possible to produce a balance sheet showing the information resources. They contend that it is even possible to value the information (knowledge) in people's heads as an asset; the human capital concept. It is, however, not an easy or straightforward task; not the cost nor the value. If properly done, the cost of information could be shocking to an organisation. They quote examples of cases where 4,000 staff members (in a high-tech company) spent 30 to 50 per cent of their time managing information at a cost of between \$700,000 and \$1.2 million per week!

The big problem of putting information as an asset on the balance sheet lies in the measurement: How to measure human or intellectual capital. Current accounting systems and principles do not apply well to something as intangible as information and, even more difficult, knowledge (Stewart, 1994: 28). Yet, some companies are already doing it. The Canadian Imperial Bank of Commerce, Skandia, Dow Chemical and Huges Aircraft have done remarkable work in this field, proving that it is possible (Stewart, 1994: 29).

A particular problem for accountants is measuring the return on intellectual capital. Any investment usually has to pass the test of return on investment (ROI) or return on assets (ROA). Ordinary capital investments can be readily expressed in terms of ROI and ROA, but presents a problem for intellectual capital. James Tobin, a Nobel Prize winner from Yale University, introduced the *q*-ratio as the ratio between an organisation's market value (stock price times shares outstanding) and the replacement value of its physical assets. The *q* ratio, although not primarily developed with intellectual capital in mind, provides an indication of what is not on the balance sheet and that includes intellectual capital. Physical capital intensive companies will have a lower *q*

than high-tech companies. Comparing q values of similar industry companies provides a relative measure of intellectual capital (Stewart, 1991: 50).

The purpose of accounting for information is to make management aware of cost and value pertaining to information with the ultimate aim being to control. This is an essential step if information is to be managed as a resource, albeit a difficult step. Standard accounting principles do not provide mechanisms to measure intellectual capital directly and it may be necessary invent a new way of accounting for information and knowledge.

5.2.4.4 Information budgeting

Part of control are the budgeting and auditing functions. Budgeting means expressing a set of planned activities for a particular period in financial or quantitative terms (Griffin, 1987: 580). The information budget should be the product after a careful analysis of the organisation's information plan (Marchand *et al.*, 1986: 218). It should include the titles of all information collections and acquisitions, the acquiring department, where it will be acquired from and at what cost. As requirements will constantly change, the budget will not remain fixed during the period. Marchand and Horton point out that the information resources must be subject to the same rules as the other resources: Should the organisation find itself having to reduce costs by cutting back on the use of resources, the information resources must also be trimmed.

5.2.4.5 Information auditing

Auditing plays an important role in control. There are mainly two types of auditing: Compliance auditing, where a check is done against set policies and procedures and advisory auditing, where users are made aware of existing systems and practices and where the emphasis is on improvement of these. Ellis *et al.* (1993: 134) contend that the information audit tends to follow the advisory model although the compliance model is also used. They claim that the information audit must have at least the following:

- Establishing the major goals of the organisation as well as the constraints;
- Determining the needs of the users;
- Building an inventory of the resources available;
- Putting the first three together to form an holistic picture.

This can be accomplished by using different approaches (Ellis *et al.*, 1993: 135 and further). The first approach is a cost-benefit methodology where the cost of obtaining the information is balanced against the benefits derived from its use. Alternative ways to obtain the same information or the same benefits must be evaluated against the cost of these alternatives. Another approach is the geographical way. Here the major components are identified and mapped in relation with each other. It starts with the education of users and it ends with needs being mapped against resources. Cost-benefit analysis does not form part of this approach.

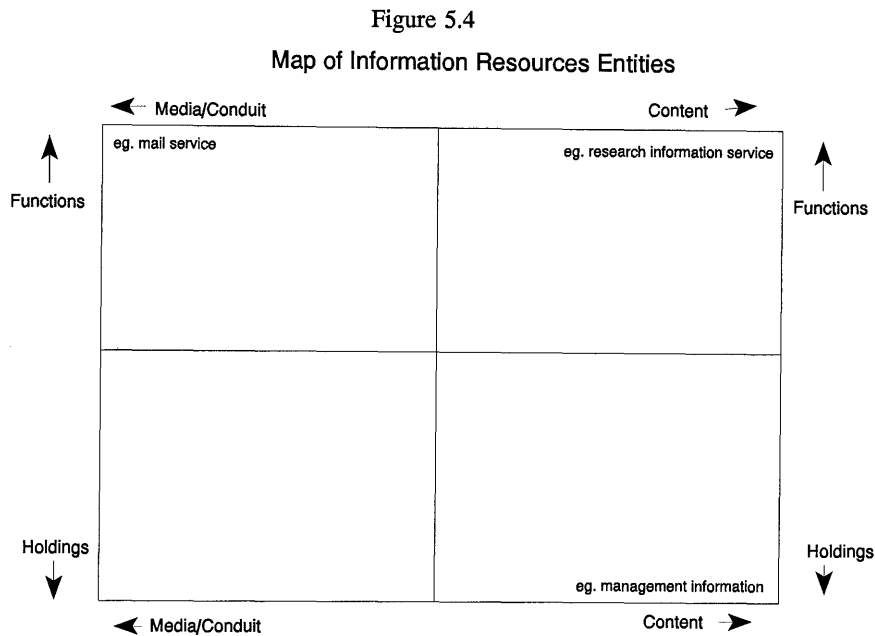
The third approach is the audit of management information. Here the management reports produced by the information systems are analysed in terms of circulation lists, stated purpose and then by identifying weaknesses and areas of improvement.

The communication system of the organisation also needs to be audited for efficiency. Interpersonal communication, management-employee communication, the public relations activity and an assessment of the effectiveness of these matters must be undertaken. The information technology and its effectiveness must also be put under the spotlight.

Information mapping is a term frequently used. Ellis *et al.* (1993: 149) point out that definitions of what information mapping is, vary, but it generally means the identification of the information resources of the organisation. These are then usually "mapped" graphically so that every employee

understands where information resources are and who is responsible for them. These maps, like road maps, must be easy to understand.

Burk and Horton (1988) wrote extensively on the subject. The process starts with the identification of the Information Resource Entities (IRE's) and by "mapping" them on a matrix grid. Each IRE is identified in terms of its function (e.g. service) as opposed to holding (e.g. product) and media/conduit



Adapted from Burk and Horton, 1988: 142

(e.g. its container) as opposed to content (e.g. meaning) (figure 5.4).

Analysis and examination of the map thus produced may show up duplications or areas lacking. The main benefit of this technique is a single page view of the information resources and their characteristics. Meltzer (1981: 88) points out that making sure that the information is available is not enough. The audit must also reveal whether the information is available when it is required and how quickly.

Information audits are particularly useful tools. It assist in determining the value, functioning, evaluation and utility of information entities in an organisation. It should also determine how the objectives of the organisation as a whole and those of individual business units are supported by the information entities (Lubbe *et al.*, 1992: 215). Meltzer writes: "The information audit is not only helpful in addressing known problems dealing with information, but aids in identifying potential trouble spots that cause serious problems in future. The information audit can serve as an 'early warning system' to identify those information resources that should be obtained now so they will be available to the organisation when they are needed in the future".

5.2.4.6 Controlling applied to the management of information

Every individual in organisational sense needs to be prudent in the way he acquires, use and dispose of information resources. It takes courage not to collect every piece of information "just in case it is needed" just as it takes courage not to make one more photocopy for the same reason. That is the challenge to the management of information as an individual responsibility within organisational context. Control is what is needed to achieve this.

5.2.4.7 Controlling applied on the individual, business, national and international levels

- The individual level

Control in terms of information management finds little application on the individual level.

- The business level

What has been said above regarding control in terms of the information management model, applies to business or any other organisation.

- The national and international levels

Control on national and international levels is closely link to the planning process. Control makes the planning happen and therefore monitoring and evaluating on these levels are indeed necessary. Both nationally and internationally care must be taken so that the "gap" between the "information rich" and the "information poor" stays within acceptable levels. The misuse of information and the abuse of people by obtaining power based on information should be monitored and controlled. National information resources should be protected for the generations to come. All of this calls for proper planning, a proper organisational structure, effective leadership and, lastly, proper control in order to ensure that it happens as planned.

5.3 Management functions

The previous section looked at the tasks of the manager; the process of management. Any manager must plan, organise, lead and control. Over the years though, certain functions within the organisation emerged as specialist areas. Marx *et al.*, (1991) identify eight such functions: Production management, procurement management, human resources management, information management, financial management, external relations management and marketing management. The eighth one he calls general management and corresponds with the steps in the management process.

It seems that some of these functions, namely production management and marketing management, have a direct bearing on information and information management. It was shown that information management is the management of the process of transforming data into information and then into knowledge. Production management and especially the principles underlying production management will, for example, be explored with a view of investigating whether those principles could be applied to information management.

The same applies to marketing management. Organisations are, generally speaking, information illiterate meaning that there is no conscious, coherent effort to manage the information resources and the information process. The information manager therefore has a special marketing task to make people aware of information, its role and its potential.

The other functions, such as human resources management and financial management will be dealt with as one. The reason for that is that human resources and financial resources can be reduced to the similar principles, namely those of resources management in general.

5.3.1 Production management

The primary function of production management is to optimise productivity. Productivity in this sense is taken to be the ratio of useful outputs to the available inputs (Marx, *et al.*, 1991: 304). In order to increase productivity the aim is to increase the outputs while reducing the inputs. The aim of production management though is not to maximise, but to optimise productivity, meaning that the market for the outputs (products) has to be taken into account.

Production management involves the following steps:

- Forecasting the demand. This is normally the task of the marketing manager, but he is assisted by the production manager. Various quantitative and qualitative methods exist for forecasting the demand.
- Following on the demand forecast, is the production plan and production budget. The production budget normally consists of the production quantity budget and the production cost budget.
- This leads to the production workplan. Machine capacity (loading) and machine scheduling form part of this plan.

- The plan is followed by implementation of the plan; dispatching the work and controlling it by means of expediting and progressing. It also involves material management (management of the activities and people involved in the movement of material), quality management (managing those variables in the production process that have an influence on the quality of the end product) and proper maintenance of the machines and equipment.

An important part of material management is procurement management, that is, obtaining the resources and other production factors necessary for the production process from the right supplier, in the correct quantities, at the right price and on time.

The above generic description of production management has much relevance for the managing of information. Essentially, managing information is also a production process. The raw material is data. This is converted through a process into information resources. The process involves machinery (computers, for instance). This process is followed by another process where information sources are transformed into, firstly, informing knowledge and the, secondly, into productive knowledge. This is a very special process as only a human mind can successfully do the transformation. It is furthermore a complicated process over which management has little control and one where the results are not always predictable. Irrational behaviour during this process is not uncommon.

Nevertheless, the principles involved in production management are applicable to the management of information. The demand must be forecast, a plan must be produced as to how the demand will be satisfied, equipment may be necessary to facilitate and assist the process, inventory of (information) resources must be established and maintained, control over the resources and processes must be maintained and so on.

When one looks at the infrastructure side in the information management model, one finds that production management has wide application in the areas of information technology and systems and also in the area of library management. Running a computer center or developing information systems is essentially nothing but a production line. A library also has a strong production application in the sense that bibliographic material is being ordered, received, catalogued, classified and then made available to users under strict controls.

Production management therefore speaks strongly to information management and it will greatly benefit the information manager to study and apply the principles in the information domain.

5.3.2 Marketing management

Marketing is a total system of interactive organisational activities aimed at the establishment of demand satisfying goods and services to current and potential clients through the determination of a price structure, its distribution and its introduction through marketing communication (Marx, *et al.*, 1991: 473). Marketing therefore rests on four pillars: Product, price, distribution and communication.

Marketing as a process is firstly defining the target market and, secondly, determining the right combination of product, price, place and using the right communication to get the message across.

In order to be effective with marketing, it is important to know the market's requirements and needs so that opportunities can be exploited. It is necessary to take cognisance of the market's cultural backgrounds, the social structures with its behaviour patterns, customs, peculiarities and characteristics of individuals in the market (gender, personality, experience, perception, attitude and motivation). All of these play important roles in the decision to buy the product or service. The customer buys a product more to satisfy a need than

the product itself and the marketing strategy must take this into account in order to be successful.

It is also important to know the competition in order to be more effective in the marketing effort. Both knowledge of the market and knowledge about the competition call for marketing research to be undertaken. This can be done through direct observation, by doing experiments or through surveys.

Once the market and the competition is known, decisions must be made in terms of the product, its price, its distribution and marketing communication. The ideal product or service range is the range an organisation has at its disposal to achieve its sales growth, market share and profitability targets. Price determination is finding the balance between what the consumer is willing to pay and the cost of the product.

Distribution decisions deal not only with the channels to get the product to the end-user and the people involved in the process, but also with the service that goes with the product. Marketing communication has to do with the conveyance of a message regarding the product or service. It could take many forms, for instance, personal selling, advertising through the mass media, verbal communication through informal discussions with customers and publicity, for example through articles in periodicals.

Any product goes through a life cycle starting with the introduction phase, then the growth phase, the mature phase and the declining phase. The marketing strategy is different for each of the four phases.

Marketing plays an important role in the management of information. The aim of information management is to satisfy the need for information with the ultimate aim to add to an individual's knowledge so as to achieve set goals. Paradoxically as it may sound, people must be educated in their use of information even though they have been consuming information since the day they were born (through sense perception). Part of the marketing is "consumer

education", that is, to raise the person's level of information awareness; getting him more "information literate".

Difficult as it may be, the users' needs for information must be fully understood in order to provide in these needs. The normal techniques of doing market research can be applied to determine the need. Exactly the same aspects as above need to be taken into consideration is determining these needs: Culture, customs, needs, gender and so on.

One would think knowledge of the competition may not be applicable to information management. Even though the information management department may not have official competition inside the organisation, competition may be present in the form of the user looking elsewhere (outside the organisation) to obtain the information he needs, be it on the golf course, the library or an information brokerage house. In the worst case, ignorance can also be considered as competition. The user may not even bother to search for the information he needs and rely on his limited knowledge.

The principles involved in marketing management are therefore very much applicable to the management of information.

5.3.3 Human Resources and Financial management

Human resources management and financial (resources) management can be reduced to making available to the organisation the optimum level of human and financial resources. In terms of human resources management it means making available the staff (through proper manpower planning, task analysis, recruitment, selection, placement and induction) and to maintain those human resources (through training and development, remuneration and benefits, motivation, task design, industrial relations and personnel administration) (Marx, *et al.*, 1991: 359).

Financial management basically means obtaining the necessary financial resources to meet the demands of the organisation (capital structure) and making sure that these resources (assets) are utilised in the best possible way (investment decisions, financial control and dividend decisions).

The principles involved in human resources and financial resources management must obviously relate closely to information (resources) management. Resources are always obtained after having determined the demand for such resources. These resources are then utilised in the production process in the best possible way, from managing the inventory level to managing the quality of the end product. This means that resources, in generic terms, are acquired, enhanced, retained and delivered.

Many writers (Horton, Lewis) contend that information (as a resource) must be put on par with the other main resources of the organisation, namely, human and financial resources. Many organisations subscribe to the idea and declare information to be a "major resource". Very few, however, put this notion in practice. One reason for this may be that information cannot be treated in exactly the same way as human and financial resources. Whilst financial and human resources management have established themselves firmly as disciplines over many decades, information management is still in its infancy and little is available as to the "how" to manage this special resource.

What is the relationship between the different resources of an organisation? Griffin (1987: 524) argues that the financial resource takes center stage. He bases his argument on the fact that all other resources are expressed and controlled in terms of the financial resource. Too much inventory, for instance, is bad to the organisation as financial resources are tied up unnecessarily. Meltzer (1981) on the other hand, calls information the "ultimate" resource; it is an economic resource, a personal resource and a national resource. Cronin (1984) says the information resource conserves the other resources. One can think of arguments why human resources practitioners may call human

resources the ultimate resource as without the human resource, no other resource would have any meaning in the first place.

It seems like a futile exercise to try and value one resource above the rest. The resources are interrelated to the extent that management of the one becomes impossible without the others.

5.3.4 Management of the information infrastructure

The information infrastructure consists of a variety of disciplines. Any discipline that supports the process of adding to a person's knowledge could be considered to form a part of the information infrastructure. In this respect one can think of education and training, library management and the management of information technology and information systems.

These disciplines have been studied and documented extensively and even though differences in opinions may still exist when it comes to implementation, it can be said that they have firmly established themselves. These disciplines are therefore not going to be dealt with in detail.

What is important though, is to realise that the management of the infrastructure is not synonymous to the management of information as it was defined in this study. It is a necessary precondition for effective information management, but not a sufficient condition.

5.4 Conclusion

Management has been defined and described by a multitude of academics and writers and even though new approaches to the concept will appear from time to time, there seems to be consensus that management means planning, organising, leading and controlling. These functions can be subdivided into many more subfunctions, such as decision making, curating, integrating and so on and more or less emphasis can be placed on different subfunctions. Some

writers may elevate some of these subfunctions to the level of functions but in the end, only the emphasis changes and not the function or subfunction itself.

For the purposes of this study, this command-and-control model was arbitrarily chosen: Planning, organising, leading and controlling. If it is then proposed that information must be managed, it follows logically that information management must involve these four functions or steps. It was also proposed that information management means management of the information resources, the process and the infrastructure. The management of these three elements must therefore imply that they must be planned, organised, lead and controlled. It was explored in this chapter if this, in fact, applies.

Planning means preparing and positioning for the future. It means that for information to be managed, the purpose, mission, vision and policy issues for information management must be developed. It also means an integration of the business plans with the information plans with the latter being in support of the first. Proper planning must be done in terms of the information needed by the business. Data must be acquired or created and it must be enhanced into information resources. Planning must also be done for knowledge creation to be facilitated. This can be accomplished through education and training of the workforce and by creating an environment conducive to learning and the generation of ideas.

Organising is necessary to realise the plans made in the planning phase. The available resources - in particular the human resources - must be allocated in an optimum way so that goals will be realised. The organisational structure for the information management function must reflect the information management model. That means that all the related activities must report to the same position. This position becomes responsible for the facilitation and coordination of the information resources, processes and infrastructure. This calls for a person having a broad range of skills and knowledge, but care must be exercised that the position does not become a technical one. The emphasis

is still on the management side and, as Weiner stated, the person must be more interested in what works than in how it works.

The information manager will have to exercise strong leadership as very few businesses seem to have made any significant progress with respect to information management as it is proposed in this study. Leading is therefore close to the heart of the information manager. Leading also relates strongly to power and the information manager will have to understand the relationship between power and information as a base for power.

Control means making sure than plans are followed so as to realise the goals set. Control of anything is impossible without information about what one wants to control. Control and information therefore go hand in hand. Control of the information resources of a business is a difficult concept to sell as most people perceive information (data) to be a free good. It is just natural for humans to collect all sorts of data and information "just in case". Control in information management terms means that this perception must change.

Control also means that proper accounting must be done of the information resources. It is suggested that information (even knowledge) must be treated as an asset rather than a cost item. Like for other resources, information (data) must be budgeted for. Information auditing, as part of the control function, means that rather than compliance auditing, advisory auditing must be undertaken.

Over and above the four management "steps", there are some specific management functions that have developed as "specialist" areas and whose principles can be applied fruitfully to information management. These are production management and marketing management. In addition, financial, human resources and information infrastructure management all have significance for information management.

It can therefore be concluded that the management principles can all be applied with relative ease to information management. This leads to the conclusion that information can in fact be managed. Not only can it be managed as a resource, it can also be managed as a process. This, at first glance, may sound logical and taken as a given. However, the special nature of information - the fact that it is a resource and at the same time a process, that it is sometimes tangible and sometimes intangible - required the assumption that information can be managed to be questioned.

The above, however, has hopefully now proved that information *can* be managed. More, that information *must* be managed.

This concludes the main arguments in the study. In the next chapter the conclusions and suggestions for further research will be addressed.
