PART II: THEORETICAL FOUNDATION (Part 1)

CHAPTER 2

HISTORICAL PERSPECTIVE OF THE INFORMATION SCIENCE DOMAIN & CONCEPT CLARIFICATION

2.1 INTRODUCTION

Over the past four decades, much has been published concerning the grounding paradigms and foundations of the Information Science discipline as well as the basic concepts found within this discipline, namely data, information and knowledge (Wersig, 1973, Brookes, 1980, Winograd & Flores 1987, Vickery & Vickery, 1987). From these publications it has become clear that various views exist concerning exactly how to define the concept information, and its resulting impact on the research field of Information Science.

This chapter will provide a brief historical perspective of the Information Science domain and a better understanding of the concepts data, information and knowledge as applied in this thesis as well as the underlying relationship between these concepts. This chapter will further clarify the concepts: global-, western-, and scientific knowledge as well as indigenous-, traditional-, and local knowledge, as these concepts form the foundation on which the thesis is grounded. The relationship between information and development will be discussed as this relationship is one of the pivotal points of the thesis.

The chapter is concluded with a discussion on the information life-cycle: how modern information communication technologies have changed the nature and lifespan of information within this life-cycle and the potential value this has for developing communities.

2.2 BRIEF HISTORICAL PERSPECTIVE OF THE INFORMATION SCIENCE DOMAIN

Although this thesis is based upon an eclectic approach, the scientific foundation of the thesis is based within Information Science. The author is therefore of opinion that it is necessary to provide the reader with a brief historical perspective of this science. There is, and always will be, a great deal of confusion regarding Information Science due to its historical development out of 'documentation' (Wersig in Cronin & Vakkari, 1992).

At the beginning of the century, a new craft appeared. Due to the overproduction of documents which overloaded the traditional library system, a new craft was needed – this craft was called "documentation" (Wersig in Cronin & Vakkari, 1991). Information Science developed from this library-related field, as a science that could foster an understanding of the new scientific approaches and theories that were needed to compensate for the more complicated documentation technologies that the existing field of documentation could not master.

Saracevic (1999), claims that the origin of Information Science can be traced back to a 1945 article by Vannevar Bush, a scientist at MIT, who was addressing the problem of the information explosion and possible solution of "making more accessible a bewildering store of knowledge," (Bush, 1945). This article was the beginning of many strategic programs by the US government in an effort to control the information explosion, first in the field of science and technology and then in all other fields. These programs were responsible for the development of today's modern information industry (Saracevic, 1999). Thus Saracevic postulates that the field of Information Science came into being as a possible solution to the ever increasing problem of an "information explosion", so as to provide ways of "making more accessible a bewildering store of knowledge."

Ingwersen (1995) is of opinion that the earliest formal use of the phrase "Information Science" was in 1958 when the Institute of Information Scientists

(IIS) was formed in the United Kingdom with Jason Farradane as its founder. The term was coined to differentiate information scientists from laboratory scientists and the primary concern for the members of the Institute was the management of technological and scientific information. Institute members included some very important pioneers in the Information Science domain, namely Brookes, Cleverdom, Fairthorne, Garfield, Kochen, Lancaster, Salton, Price and Vickery. With the newly coined name "Information Science" the members wanted to emphasise the importance and value of the scientific study of scientific information and the processes involved in handling scientific communication (Ingewersen, 1995). Unfortunately, this emphasis also contributed to the identity crisis of the Information Science domain. Traditionally the practical implementation of scientific results was the responsibility of documentalists and librarians. Now a new discipline emerged taking responsibility for the processing of documents and information.

Notwithstanding the similarities between the Documentalists, Librarians and Information Scientists, Ingwersen (1995) is of the opinion that a division of perspectives existed between the disciplines throughout the post-war period. This divergence can be seen in the alternative name of the field, namely Library and Information Science. In South Africa this divergence could also clearly be seen in the naming of the university academic departments. At the University of Pretoria the name of the department was still the 'Department of Library and Information Science' from the conception of the Information Science Department up to 1995. This name was then changed to the 'Department of Information Science', acknowledging the artificial divergence between the two disciplines and recognising that although the skill set might vary, the two disciplines' core functions are the same.

Ingwersen (1995) criticises the notion that Information Science was born out of the problems associated with the extremely fast-growing body of knowledge: the post-war information explosion. His arguments against this notion are firstly that the perceived "information explosion" in science and society was, in reality, only a document explosion, and that this explosion resulted in even more troublesome accessibility to both the physical document

and its intellectual content. His second point of criticism is that you do not need to establish a science to provide access to documents. What you do need is skills to help people handle the growth in documents, and that is a practical job that has been done by archivist, documentalist and librarian for over five millennia (Ingwersen, 1995:138).

The author agrees with Ingwersens' point of criticism against this superficial conception of the science. Today, the internet can be seen as the largest collection of documents ever written, exceeding 4 billion public pages and connected to more than 550 billion documents (Lyman, 2002). This is an even bigger document explosion than in the late 1940's, resulting in bigger access problems to the physical document as well as the intellectual content thereof. However, it is not the Information Scientists alone who are trying to make more accessible this bewildering store of knowledge. As Ingwersen (1995) rightly pointed out, this is one of the jobs "that has been done by archivist, documentalist and librarians for over five millennia." In terms of the accessibility to the physical document, it will be shown later that Governments and Industry are trying to work together to solve physical infrastructure access issues. Information Scientists are only one of the players in this arena. The problems relating to information, i.e. information overload, information access and information retrieval have existed for a very long time. However, this social responsibility of government is even more prevalent today, in the twenty first century, where it has become crucial for governments (especially governments of developing countries) to create and install programs that will help lead their countries to the 'information and knowledge society'– a concept that will be discussed later in this thesis.

In the following section the author will discuss and clarify the important concepts of the thesis.

2.3 CLARIFYING CONCEPTS

In the thesis to follow, the author will refer to various concepts that at the outset need to be clarified. The first of these are the concepts data,

information, knowledge and the underlying relationship between them. In society today, the concepts data, information and knowledge are often used indiscriminately as synonyms of each other. This is incorrect and, as the following section will indicate, a clear distinction can be drawn between the concepts.

2.3.1 Data, Information and Knowledge

Before trying to understand the complex relationship between data, information and knowledge, as well as the relationship between information and development, the concepts data, information and knowledge must first be defined. As early as the 1970s, a distinction between data and information can be found in the CODASYL report (1971). Although this was not an Information Science publication, and the information within this report referred to database systems, this distinction was still useful for Information Scientists to define the broad concepts of their study field (Spiegler, 2003).

According to this report, data can be described as any symbols that have been inscribed by instruments or human hands (Spiegler, 2003). This definition shows similarities with the broad definition of data as defined by Boon (1992) who described data as "facts and concepts, normally structured according to some or other method of organisation," (Boon, 1992:64). Compared to the definition of the CODASYL report (1971), Boon's definition of data implies that the organisation could thus be by human hands or by instrument (database systems). Zinz (2006) states that data is commonly conceived as being the raw material for information. Correlated to the definitions of the CODASYL report, symbols can thus be seen to be raw material.

More than 2 decades ago, Machlup (1983) discussed the concept of data by looking at the linguistic origin of the word. Data is derived from the Latin *dare*, which means "to give", *datum* "the given" (singular) and *data*, "the givens" (plural). Thus if the author takes the CODASYL report and Zinz' (2006)

definition into consideration, data would be the raw material *given* to the analyst or instrument.

In the context of this thesis and from within a local knowledge perspective (which will be defined and discussed further later in this thesis), this 'raw material' would be the uncontextualised global knowledge (which will also be defined and discussed further later) *given* to the developing communities, from the developed communities, by way of the internet.

For the purpose of this thesis, data can be defined as follows: unprocessed, uncontextualised global knowledge that has no added value, interpretation, meaning or context. The focus during this thesis will be on data obtained from the internet.

The next important concept is that of information. This concept is a very ill defined, elusive concept with numerous definitions and contexts. Segundo (2002), makes it clear that the range of definitions for the concept 'information' is very wide. Authors such as Wellish (cited in Sanz *et al*, 1994) refer to 39 definitions of the concept. Most information scientists appear to be very reluctant to offer concise *definitions* of the concept, preferring to rather discuss the *concept* than to define it (Madden, 2000). Belkin (1978) explains this difference by saying that a *definition* "says what the phenomenon defined is," whereby discussing the *concept* is a way of, "looking at or interpreting the phenomenon," (Belkin, 1978:58). In his book, *Information Science - an integrated view,* Debons (1988) follows this methodology and, rather than defining the concept information, interprets the phenomenon by discussing six contexts in which information is most often used. The following contexts are identified:

- **Information as commodity** – this could be something in a book, in your head, corporate files etc. In this context, information assumes economic value which, in turn, implies management processes.

- **Information as energy** – In this context, information is seen as a quantifiable physical entity, a presence/absence that can be verified experimentally. The transmission of the information occurs by means of 'energy waves' or 'energy transfer' which is then picked up by a person's senses.
- **Information as communication** - Information is often seen as being synonymous with communication. When one person communicates with another person, the person who is initiating the exchange of data, is moving/transferring his/her understanding of data (together with actual data) to the other person (receiver of data). When received, the person (receiver) is informed. Thus, being informed is a result of the communication process.
- **Information as facts** – Here Debons (1988) distinguished between information as facts and information as data. A fact is similar to data in that you may be aware of specific facts, but unless these facts are placed in context, they will remain facts and nothing else. A fact is, however, different from data in that it entails inherent meaning. For example, that the 14th of February is St Valentine's Day, becomes a fact, because you know that this date is associated with love; this is inherent meaning.
- **Information as data** – In this context, information is the product of symbols arranged according to certain established rules/conventions. Debons (1988) indicates that the difference between facts and data is very important. When it is convenient for us to discuss information in the absence of any meaning or context, information is associated with data. For example, binary code, "00100101" is data, seeing that no meaning has been attached to it.
- **Information as knowledge** - In this context Debons (1988) refers to information as a person's intellectual capability to draw conclusions. Knowledge must be deduced, not simply sensed.

In a more recent article by McCreadie & Rice (1999) various concepts of information proposed over the last fifty years are reviewed. These concepts

are very similar to the contexts as discussed by Debons (1988). The following is a summary of the concepts they consider:

- **Information as a representation of knowledge** – According to McCreadie and Rice (1999), information can be viewed as stored knowledge. This storage medium has traditionally been books but increasingly, electronic media are becoming more important (Madden, 2000).
- **Information as data in the environment** – In this concept, information can be obtained from various environmental stimuli.
- **Information as part of the communication process** – This concept is similar to Debons' (1988) information as communication context, where meaning to the data that is communicated is situated with the people taking part in the communication process. Other social factors such as timing, also play a significant role in the processing and interpretation of the information (Madden, 2000).
- **Information as a resource or commodity** – Here, information can have added value. This correlates with Debons' (1988) information as commodity context where this added value assumes economic value and could be something in a book, in your head, or corporate files.

With the exception of the contexts discussed above (Debons, 1988) and those of McCreadie & Rice (1999), there are a few isolated concise definitions found in literature. According to Spiegler (2003), if the value of information is determined by the receiver and not the sender, a parallel inference can be made that data becomes information when it is processed and value added to it. From this definition the author can deduce that information is processed data.

Looking back at older Information Science literature, the following definitions can be found:

Kochen (1975:5) regards information as data in an appropriate and usable form. This correlates with Spiegler's (2003) parallel inference, thus this appropriate and usable form can be in the way that value is added. Blom

(1980:25) defines information as, “any input that can be processed intellectually or cognitively for the development of meaning.”

The following definitions are from newer Information Science literature and are based on the same principles. In all of the following definitions some form of action, processing, meaning and value adding is visible. Information can be regarded as: *processing* of sensory data; the product of social *interaction*; the consequences of *action*; *meaning* assigned to databases and the result of *analysing* and *interpreting* data (Ruben, 1990, Bourdreau & Couillard, 1999, Segundo, 2002).

In the context of this thesis and from within a local knowledge perspective, the value adding (Spiegler, 2003) and processing would be the interaction and exchange of data between the local knowledge systems and the global knowledge system. This interaction and exchange results in processed contextualised information.

For the purpose of this thesis, information can thus be defined as follows: Processed contextualised data that has added value and meaning due to the specific context within which it is used. In the context of the thesis, the focus will be on information obtained from the internet.

The third concept that needs to be addressed is the concept of knowledge. This is no easy task. As seen in the above discussion, there is multiplicity of ways of conceiving information and these will lead to a multiplicity of ways of conceiving knowledge (Segundo, 2002). According to Spiegler’s (2003) parallel inference, if data becomes information when value is added, then information becomes knowledge when insight, abstraction and better understanding are added (Spiegler, 2003:535).

This inference is the basis of many definitions of knowledge as found in Information Science literature. Polanyi (1962) states that knowledge can be defined as an activity which would be better described as a *process of knowing*. Taylor (1986) indicates that knowledge is the result of

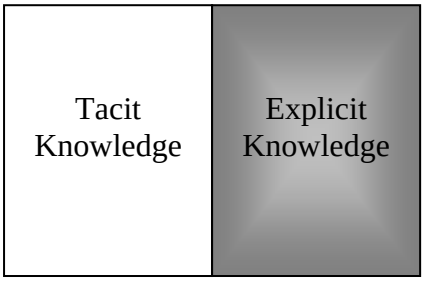
organisational value adding processes such as analysing and judging, which entails activities such as interpreting, comparing, evaluating, synthesizing etc. These activities lead to effective human action. Nonaka (1996) defines knowledge as "a justified belief that increases an entity's capacity for effective action." This effective action can be in the form of decision making as Kanter (1999) defines knowledge as the power to act and make value-producing decisions. Vail (1999) elaborates on these value-producing decisions by defining knowledge as information that is made actionable in a way that adds value to the enterprise. From these definitions of knowledge, the author can deduce that knowledge is actionable, and is, thus, information in action. This correlates with the definitions of knowledge given by philosophers: *knowing-that* and *knowing-how*. Knowing-that is factual while knowing-how is actionable (Spiegler, 2003).

Recently, in the field of Knowledge Management, two types of knowledge have been gaining general acceptance. These are tacit knowledge and explicit knowledge. They are used throughout the pioneering work of Nonaka and Takeuchi's knowledge creating company (Spiegler, 2003). Nonaka & Takeuchi (1995) are of the opinion that knowledge is created through continuous exchanges between tacit and explicit knowledge. Explicit knowledge is formal models, rules and procedures and tacit knowledge is implicit, mental models and the experiences of individuals.

According to Takahasi & Vandenbrink (2004) this explicit knowledge is actually information in digital form while tacit knowledge cannot be expressed fully in words and exists in the minds of individuals. These two types of knowledge are important in the context of this thesis. Developing communities need to be able to access digital information from the internet (explicit knowledge) and combine this with their local knowledge and experiences (tacit knowledge) to create contextualised knowledge. Thus knowledge that has been contextualised with the necessary information literacy skills to suit the specific need of user.

Takahashi & Vandenbrink (2004) introduce a third type of knowledge into the mix, namely that of formative knowledge. According to them, formative knowledge lies somewhere between tacit and explicit knowledge. To explain this, Takahasi & Vandenbrink (2004) make use of the following diagrams:

A) Knowledge Dichotomy



B) Knowledge Geography

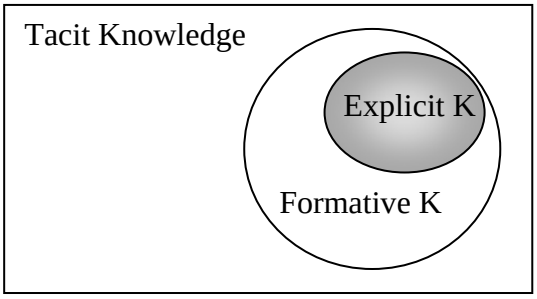


Figure 2.1: Knowledge Dichotomy and knowledge geography

Traditionally in Knowledge Management, the knowledge dichotomy exists with only two kinds of knowledge (Figure 2.1: A), tacit and explicit knowledge. Takahasi & Vandenbrink (2004) suggest the so-called knowledge geography (Figure 2.1: B). Here tacit knowledge is like a sea and explicit knowledge is the island arising out of it. Formative knowledge is the shifting beach between the island and the sea (Takahashi & Vandenbrink, 2004). They believe that formative knowledge differs from explicit knowledge because it is not fixed, but, like explicit knowledge, it can be copied and re-produced.

It is the author's opinion that this third type of knowledge is equal to the contextualised knowledge that will be discussed later in thesis. Thus, developing communities need to be able to access digital information from the internet (explicit knowledge) and combine this with their local knowledge and experiences (tacit knowledge) to create contextualised knowledge (formative knowledge).

From the perspective of this thesis, knowledge can thus be defined as the product of the constant interaction and exchange between developing communities' tacit and explicit knowledge.

In the following section attention will be given to the concepts global, scientific and western knowledge.

2.3.2 Global / Scientific / Western Knowledge

In the author's search for sources that defined the term global knowledge, an interesting fact came to light. Although many authors (Labelle, 1997; Manley, 1997; Gregson & Raj Upadhaya, 2000) use the term, nearly none of them actually define what they mean when referring to global knowledge. It is as if these scholars assume that the readers know what they are referring to. Even the World bank, United Nations and United Nations Educational Scientific and Cultural Organisation (UNESCO), do not actually define the term, although they support projects like the Global Knowledge Partnership (www.globalknowledge.org). This partnership (GKP) is a worldwide network committed to harnessing the potential of information and communication technologies for sustainable and unbiased development. Their vision is a world of equal opportunities where all people can use and access information and knowledge to improve their everyday lives. The network enables the sharing of information, knowledge, experiences and resources to help reduce poverty and empower communities.

Conferences, for example the GK I (Global Knowledge Conference '97) held in Toronto, Ontario, June 1997 and GK II, held in March 2000, in Kuala Lampur, Malaysia, were the initiative of the GKP, but nowhere is the term defined. Even the International Federation of Library Association and Institutions (IFLA) have had a conference entitled: "Global Knowledge: a challenge for librarians" in Jerusalem, Israel, 13-18 August 2000, where it was recognised that global knowledge poses a possible threat and challenge to librarians, but again, the term global knowledge was never defined. Even commercial companies offering services ranging from high definition televisions to companies offering global IT services have jumped onto the bandwagon, and have realised that this is a current buzzword (www.globalknowledge.com).

What was prevalent though, is that the term is mostly used when referring to the corpus of knowledge held by the developed world, or when referring to information that is available via the internet or in Cyberspace (Gregson & Ray Upadhaya, 2000). Does this then, imply that global knowledge just refers to locality and access?

Information that is available globally via, for example, the internet, would then be classified as global knowledge. The author strongly disagrees with this notion. If this was the case, what would then happen when indigenous knowledge is made available via the internet? Would it then automatically be classified as global knowledge just because it is now available globally? With no regard to the nature or context of the information?

This argument is supported by the one definition found by the author in a paper by Dr. Magdalena Mok Mo Ching, presented at a UNESCO conference entitled "Global Knowledge for a learning society." In this paper, Mok Mo Ching (2000) defines global knowledge as "the knowledge that is beyond local and indigenous context." Thus, information that is not found locally, but more important, information that is not found within the developing communities' context and possibly understanding can be defined as global knowledge. It is the author's opinion that this definition can be elaborated to include the receiver of the information or knowledge. Thus, knowledge that is beyond the local and indigenous contexts of the receiver that has the potential of becoming global knowledge to the receiver if he/she can contextualise this knowledge and make it his/her own and benefit from it.

The problem intensifies when looking for possible synonyms for the term global knowledge. When considering the terms scientific knowledge / western knowledge as possible substitutes, even more problems are encountered.

Heyd (1995) sees scientific knowledge as paradigmatic of knowledge itself. Scientific knowledge is usually regarded as a synonym for western knowledge and can be defined as knowledge that is accumulated by systematic study and organised by general principals. For example, Mathematics is the basis

for much scientific knowledge (WordNet Dicionary). The author disagrees with this notion in that it is not only western knowledge that is accumulated by systematic study and organised by general principals, eastern knowledge is also accumulated through these processes. Denning (2000) explains that in the East, the tradition has been to celebrate tacit knowledge and the importance of the intuitive, whereas in the West, intuitive knowledge has often been devalued in favour of rational scientific knowledge**.**

When looking at the term western knowledge, it is easy to fall into the same trap as with global knowledge – does the term western just denote locality? Thus, it would be the knowledge that is produced by the West. If this is the case, who exactly would the West be? Odora Hoppers (2000) theorises that this could possibly be the developed countries whose education systems are based on western theories.

The term scientific knowledge did not prove to be less problematic. This problem was also faced by many authors when indigenous knowledge as a subject came under the spotlight. Frequently, scientific knowledge is contrasted with indigenous knowledge (Ellen & Harris, 1996; Michel & Gayton, 2002; Heyd, 1995). According to Ellen & Harris (1996) the use of the terms “western / scientific knowledge” and “indigenous knowledge” forced us into an oppositional logic of “us and them.” This can further be explained by the “hegemonic opposition” of the privileged us and the subordinated them (Ellen & Harris, 1996).

Odora Hoppers (2000) is of the opinion that this hegemonic opposition results in a fundamental intolerance of modern science toward the legitimacy of indigenous/ traditional knowledge. This leads to hierarchies of knowledge systems that are built where western / scientific knowledge is placed higher or regarded as being more important than indigenous / traditional knowledge (Michel & Gayton, 2002).

It is the author’s opinion that the term global knowledge if defined as “the knowledge that is beyond local and indigenous context” (Mok Mo Ching,

2000) is still the better choice to use, so that the author can steer clear of any possible chance of creating an oppositional logic of "us" against "them" or the possibility of building hierarchies of knowledge systems. The author would further like to elaborate upon this definition to take account of the specific knowledge system, by including the delivery mechanism of this specific knowledge, namely the internet, and by including the usability of the global knowledge for developing communities.

Thus from the context of this thesis, **global knowledge** can be defined as "the usable content that is beyond local and indigenous context due to numerous infrastructure, financial, social and content barriers". Based upon this definition, and seen from the perspective of this thesis the **global knowledge system** would thus be "a collection of usable content available on the internet that is beyond local and indigenous context due to numerous infrastructure, financial, social and content barriers". These barriers will be discussed later in the thesis.

In the following section attention will be given to the concepts indigenous, local and traditional knowledge.

2.3.3 Indigenous / Local / Traditional Knowledge

Whilst information defining the term global knowledge was difficult to obtain, information defining indigenous knowledge was much more readily available. The author experienced no problems in finding many sources defining indigenous knowledge. Although in concept, indigenous knowledge is not a new field, it has only recently come under the spotlight with even governments using it as a political rallying word with ideological connotations.

The term 'indigenous knowledge', as used by many authors, is an extremely broad concept and the meaning of the term is by no means clear to everyone. In an effort to clarify the meaning for lay people, the Indigenous Knowledge and Development Monitor (IKDM), a publication that promotes the exchange of information on indigenous knowledge, decided to settle on three definitions

of Indigenous Knowledge, as they discuss what this field entails and the possible approaches (IKDM, 1998).

It is the authors' opinion that these three definitions sum up the true essence of the study field. The first definition is that of D.M Warren (1991): "The term indigenous knowledge (IK) is used synonymously with 'traditional' and 'local' knowledge to differentiate the knowledge developed by a given community from the international knowledge system sometimes also called the 'western system', generated through universities, government research centres and private industry. IK refers to the knowledge of indigenous people as well as any other defined community." In this definition, Warren specifies that indigenous knowledge differs from the knowledge generated in the 'western system', and refers to other communities - not only communities consisting of indigenous people. Thus any knowledge generated by people in a given community that differs from the knowledge generated in the western system is seen as indigenous knowledge.

The author disagrees with this definition and is of the opinion that the knowledge generation within an indigenous knowledge system might be limited to, but is not necessarily different from, the knowledge generation process of a western system. Within a developing community, the exchange and transfer between the indigenous people's tacit knowledge and explicit knowledge will be limited because of the limited amount of explicit knowledge available, but the transfer and exchange will still take place.

The second definition supported by the IKDM, was proposed by Louise Grenier (IKDM, 1998) in her guide for researchers: "The unique, traditional, local knowledge existing within and developed around the specific conditions of women and men indigenous to a particular geographic area." Again, in this definition, IK is not placed as belonging to indigenous people (as in the World Bank's definition) but is said to belong to any men and women who are indigenous to a specific area. Thus, in South Africa, men and women who are indigenous to a specific local community, could possess, generate and use knowledge that is indigenous to them and their specific community.

The third definition slightly differs from Grenier's view and reads as follows (IKDM, 1998): "Indigenous knowledge is the sum total of the knowledge and skills which people in a particular geographic area possess, and which enables them to get the most out of their natural environment. Most of this knowledge and these skills have been passed down from earlier generations, but individual men and women in each new generation adapt and add to this body of knowledge in a constant adjustment to changing circumstances and environmental conditions. They, in turn, pass the body of knowledge, intact, on to the next generations, in an effort to provide them with survival strategies." This is a very descriptive definition and some points should be emphasised. Firstly, according to this definition, IK can be more than mere knowledge - it can also entail skills and the application of this knowledge, and would, thus, relate to wisdom. Would this, then, be indigenous wisdom? Secondly, indigenous knowledge is not static in nature. Generation after generation has added and made changes to the existing body of knowledge.

Definitions of indigenous knowledge, like the above mentioned, position the terms indigenous, traditional and local as synonyms which are used interchangeably. Even the World Bank sees the term indigenous knowledge as being synonymous with local knowledge and states in their definition that: "Indigenous knowledge is local knowledge" (World Bank, 2005). The UN uses a similar definition and states that: "Indigenous knowledge is local knowledge unique to every culture or society and is the basis for local decision making and problem solving in areas including, but not limited to, agriculture, health care, food preparation, education and natural resource management."

However, Brouwer (1998) is of the opinion that indigenous knowledge must be differentiated from traditional knowledge. Tradition comprises proven ancient, original and distinctive customs, routines and conventions. Therefore, tradition operates on the practical level and is often based on opinion or belief. Here, Hobsbawm & Ranger (1983) warns that true tradition must be distinguished from 'invented tradition'. This distinction is not made by most authors. Authors like Odora Hoppers (2000) and Heyd (1995), who compare indigenous knowledge to scientific knowledge, use the fact that indigenous

knowledge is often based on belief as one of the distinguishing characteristics of indigenous knowledge that differentiates it from scientific knowledge.

In the context of this thesis, the concepts, traditional and indigenous knowledge will not be used. The author prefers the use of the concept, local knowledge. If the term indigenous knowledge is used, the author could become ensnared in political agendas. The author is further convinced that the term indigenous knowledge lends itself more to the definition as defined by the World Bank, namely knowledge belonging to indigenous people. Seeing that this thesis will focus on developed and developing countries where there are local people indigenous to a specific country, it would be best to steer clear of this term. Due to the possible negative connotations with the term 'traditional' and some people believing that anything that is traditional is second best to the modern or new, the author feels that this would also not be a suitable choice. For these reasons the author will use the term local knowledge and local knowledge systems. Seen from the perspective of this thesis **local knowledge** can thus be defined as "knowledge and/or skills that are specific to people or communities". Based upon this definition a **local knowledge system** can accordingly be defined as "knowledge and/or skills that are specific to people or communities in a particular area and that is contextualised within this area".

As indicated while defining the concepts, data, information and knowledge, there is a clear relationship between these concepts. This relationship will be discussed in the following section.

2.4 THE RELATIONSHIP BETWEEN THE CONCEPTS

2.4.1 The relationship between data, information, and knowledge

As already mentioned, a clear relationship exists between the concepts of data, information and knowledge. This relationship between the concepts can also be extended to include development. Firstly the author will discuss the relationship between data, information and knowledge. According to Spiegler

(2003) this relationship can be seen in the so-called parallel inference that exists between the concepts. As already discussed, if the value of information is determined by the receiver and not the sender, the parallel inference is that: "if data becomes information when they add value, then information becomes knowledge when it adds insight, abstraction and better understanding," (Spiegler, 2003:535). From this inference the author can deduce that the concepts data, information and knowledge are building blocks of one another, thus interdependent upon each other and are known as the conventional knowledge hierarchy.

Spiegler (2000:2) depicts this relationship as a "recursive spiral" where "yesterday's data is today's information and tomorrow's knowledge, which in turn cycles back through the value chain into information and then into data." This spiral, depicted in Figure 2.2 below, defines a life-cycle of knowledge production (Spiegler, 2003:534).

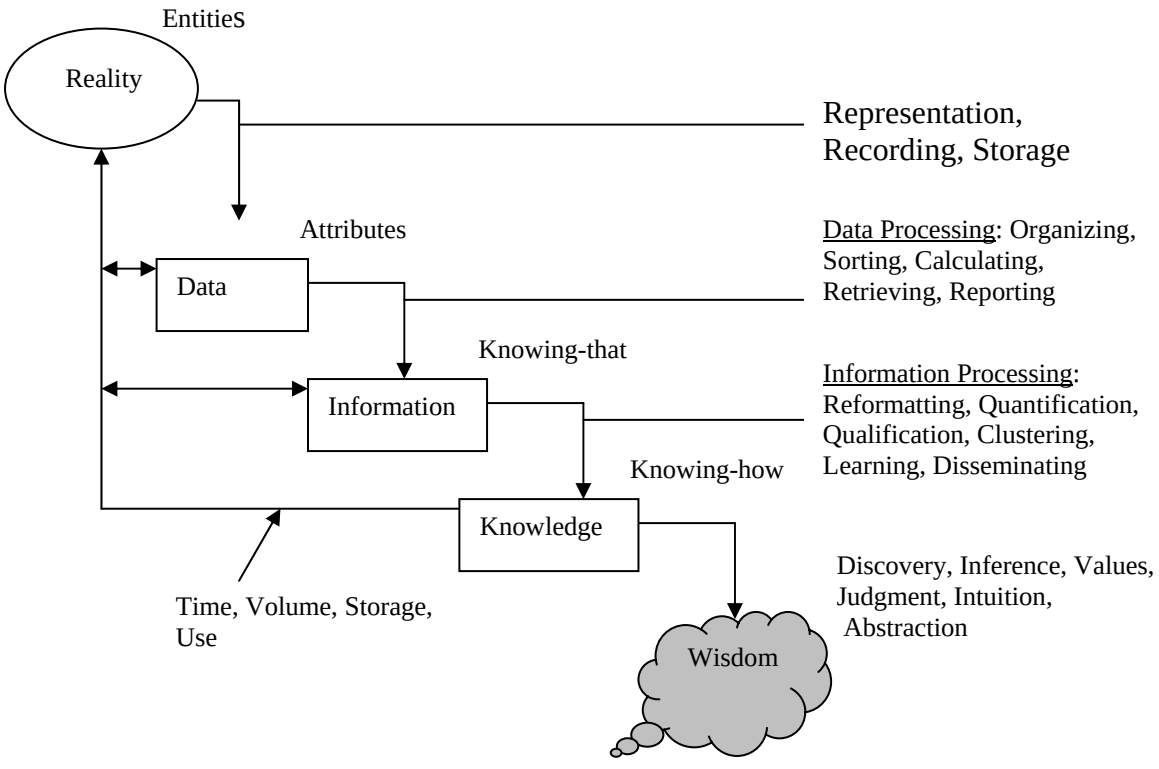


Figure 2.2: Data, information and knowledge

From Figure 2.2, the relationship between data, information and knowledge can be clearly seen. Data leads to information, information leads to

knowledge and knowledge leads to wisdom. This figure also depicts the philosophers' definition of knowledge namely *knowing-that* and *knowing-how* as already discussed in defining the concept knowledge (Spiegler, 2003). Debons, (1988) depicts the relationship between the concepts, data, information and knowledge as being part of a continuum called the knowledge spectrum, one leading into another, thus the latter being dependant on the previous one. Each one is the result of actions on the preceding one, with no clear boundaries between them. This spectrum is depicted in a linear fashion and not a cyclic pattern as depicted by Spiegler (2003). This is depicted by Figure 2.3 (Debons, 1988:5):

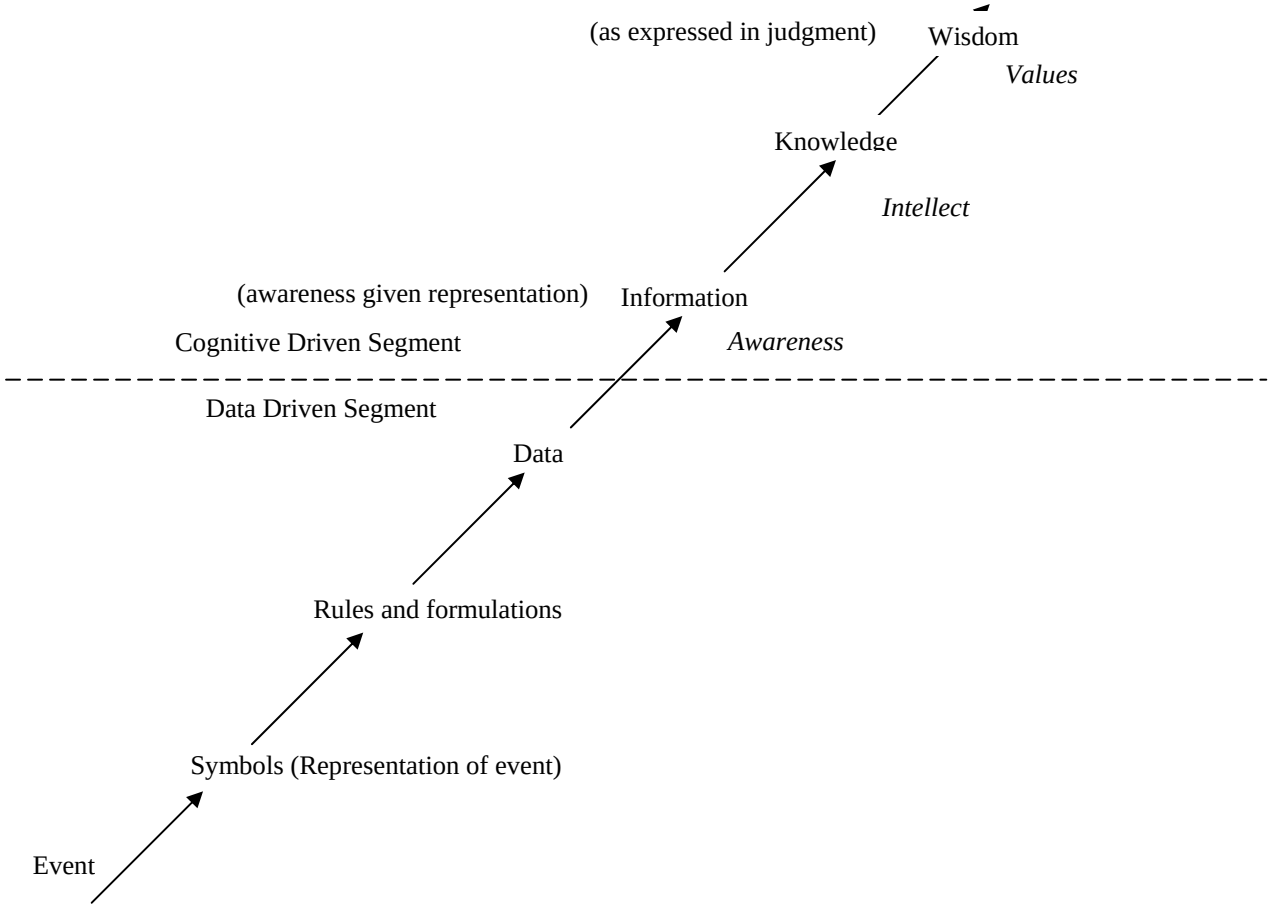


Figure 2.3: The Knowledge Spectrum

It is the author's opinion that the event (some condition or change in the state of the world) that occurs, and the representation thereof according to the rules and formulations, is the same as the "reality" represented in Spieglers' Figure 2.2 A further interesting aspect is that Debons indicated (in 1988 already) the data-driven segment and the cognitive-driven segment, indicating a clear

understanding of the cognitive processing that has to take place in the mind of the receiver of the data in order to process it to a higher level. This correlates with the Nonaka & Takeuchi (1995) definition of explicit and tacit knowledge. The data-driven segment as indicated by Debons (1988) shows strong similarities with Nonaka's and Takeachi explicit knowledge in that both are fixed, and relate to formal models, rules and procedures. Debons' (1988) cognitive-driven segment also shows similarities with tacit knowledge. Both refer to mental models (where awareness is given to representation) and the experiences of individuals (as expressed in judgment and values).

Taylor (1986) elaborates on these actions as discussed by Debons (1988) and describes them as value added processes that have as their purpose the promotion of data to information to knowledge actions. These actions can include decision-making and development, which, in turn, depict the relationship between information and development. This linear relationship is depicted in Figure 2.4, and looks as follows:

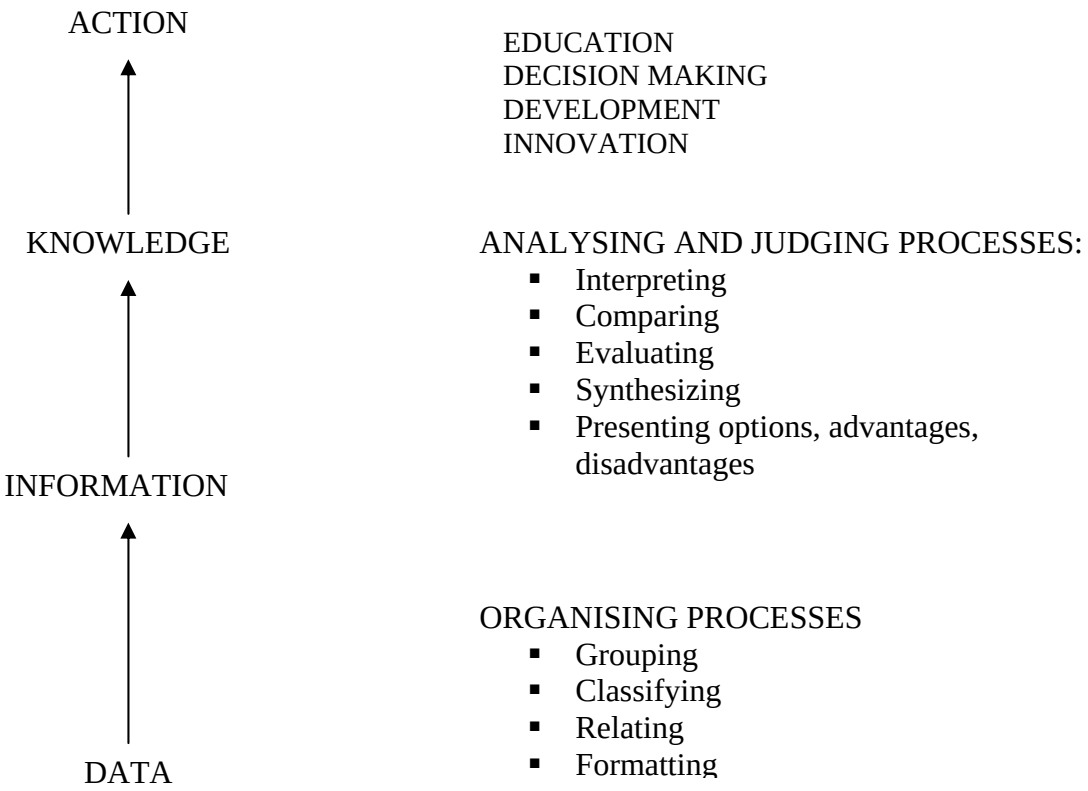


Figure 2.4: The linear relationship from data to action.

As can be seen in the above figure, Taylor concentrates on the value added processes that take place in the mental processing between each concept that do not appear or are not elaborated on in Spiegler's (2003) or Debons' (1988) models. The model of Boon, however, falls short in that it does not indicate where the data comes from, whereas both the Spiegler's and Debons' models indicate that data is derived from the reality or an event in reality. Taylor's (1986) model is very relevant to this thesis as it indicates the relationship between information and development, where knowledge progresses into action. This action can include education, decision-making, innovation or development. This relationship will be further explored in the following section of this thesis.

2.4.2 The relationship between information and development

Due to rapid technological developments in the 21st century, a surfeit of information has been produced. This can be seen in the internet which is, by far, the largest collection of documents ever written, exceeding 4 billion public pages and connected to more than 550 billion documents (Lyman, 2002). Can this information been beneficial for development? This question will be addressed later in this thesis but, before this can happen, the author first has to explore the relationship that exists between information and development.

This relationship is so important that in 2003, the Development Bank of Southern Africa dedicated a whole publication, *The Role of Information in Development,* to emphasise the role of information in development. This publication was written as a reference book to be used by development information specialists and development practitioners in an attempt to quantify the impact that access to, or the provision of, information has on development in any given sphere.

Before the author can explore the relationship between information and development, it is necessary to attempt to define the concept of development. The concept of development has been debated over a period of many years. In 1977 an international attempt was made to define the concept in a

conference 'Towards a redefinition of development' (Boon, 1992:64). According to this conference 'development' can be typified as "making the earth a fit place to live in." This is not a very concise definition. Neelameghan (1980:4) discussed that the earth can be made a fit place to live in by defining development as a process - a process with many facets which is directed to qualitative and quantitative change. Astle (1989) is of the opinion that development is more than just a process, and defines development as a process, a condition or a combination of the two.

The relationship between information and development is not a 'new' relationship. As already discussed, Taylor (1986) links the relationship between the concepts data, information and knowledge with actions. According to him, productive knowledge is converted to actions when decision-making processes are under way (Taylor, 1986:6). These decision-making processes can include development. Dedijer & Jequier (1987:14) depict the relationship between information and development in a so-called information pyramid. On the bottom layer, data is depicted, then information, then knowledge and at the top, intelligence. Here, intelligence, is defined as the ability of individuals or organisations to adapt to the demands of the environment in a coherent manner (Boon, 1992:64). This adaptation process of the individuals or organisation can be seen as development. After an in-depth discussion on the concepts information and development, Boon (1992) depicts the relation between them in the following figure.

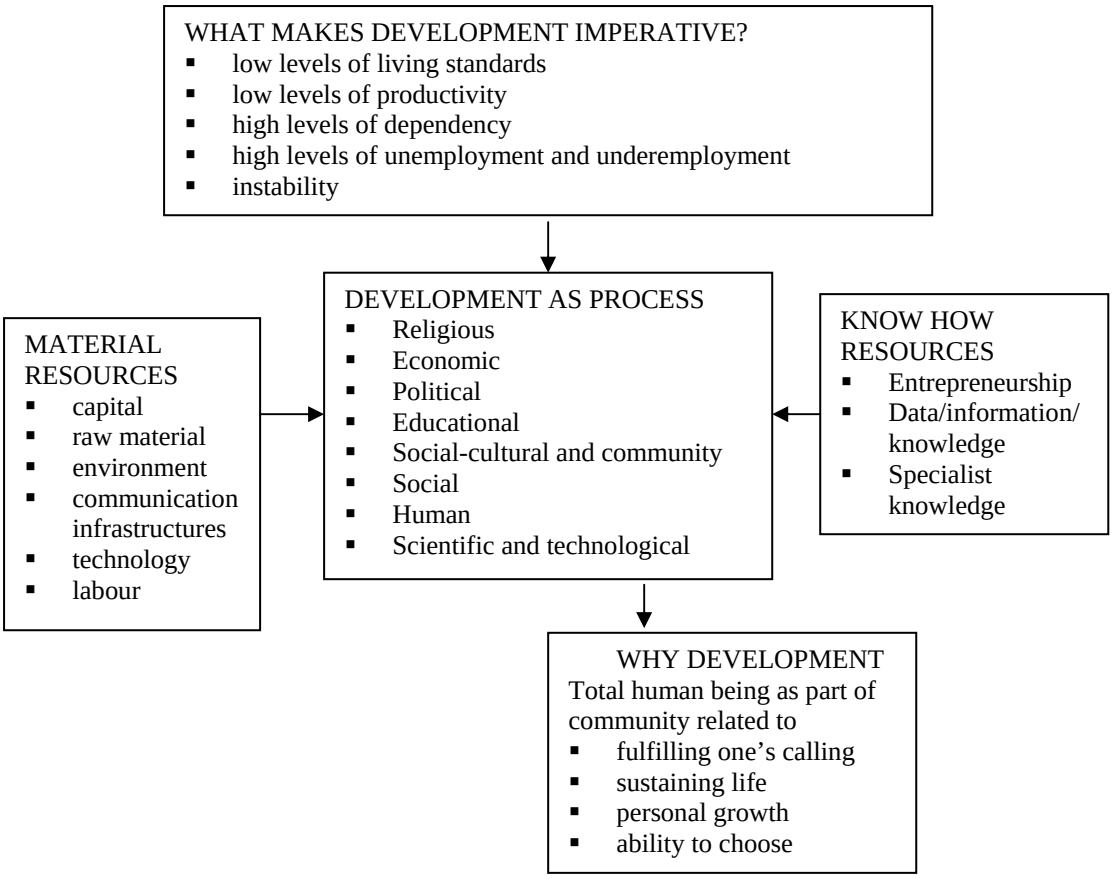


Figure 2.5: Development: resources needed

Boon's (1992:65) representation clearly shows that information as a knowledge resource can make a direct contribution to development. Mncube (2003) supports this view and states that it is axiomatic that information be recognised as an essential resource for social and economic development. Thus, the author can deduce that a relationship exists between information and development and that information is a vital resource for the progression of developing communities and countries on the road to the information and knowledge society.

Heeks (2002) supports this argument and states that information and knowledge are at the core of enabling a developing country to become part of the information and knowledge society. Heeks is of the opinion that education and decision-making contribute directly to development and that this decision-making relies on information which, in turn, is converted into knowledge. He elaborates on this argument by introducing the concept of information communication technologies that can, according to him, deliver information

and knowledge. However, this information and knowledge has no value unless it results in decision-making and actions. Heeks's (2002) systematic view of ICT and its role in development is depicted in the Heeks Model below:

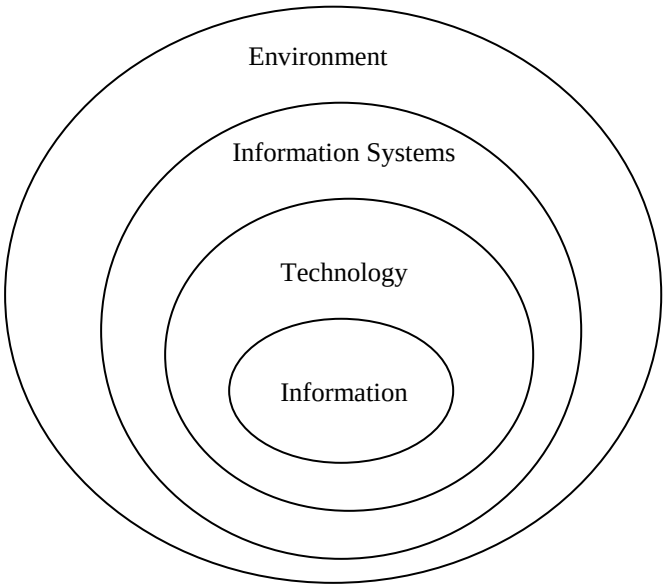


Figure 2.6: The Heeks Model

From the perspective and context of this thesis, the author agrees with Heeks' (2002) view that ICT can deliver information but disagrees that ICT can deliver knowledge. In this thesis, Information is defined as "the processed, contextualised data, obtained from the internet, with added value and meaning due to the specific context within which it is used." Thus, information can be delivered through ICT. Knowledge is defined in this thesis as the "product of the constant interaction and exchange between developing communities' tacit and explicit knowledge." Explicit knowledge can be in the form of electronic documents and can thus be made available via ICT. Tacit knowledge, however, is situated in the mind of the receiver of information and, thus, will differ from receiver to receiver. Knowledge, seen from within this context, cannot be delivered by ICT. Although the author only partly agrees with Heeks' statement that ICT can deliver information and knowledge, the Heeks's model does highlight the importance of placing the focus on information as apposed to technology when attempting to bridge the digital divide (a concept that will be discussed at a later point).

As can be seen from the above discussion, the relationship between information and development is a crucial one. Mncube (2003:6) makes it clear that the failure to recognise this vital role of information within the development arena has egregious consequences for development. Further study into this relationship would definitely enhance the prospects of development success.

In the following section, the author is going to discuss the life-cycle of information and discuss how the nature of this life-cycle has changed due to modern information communication technologies.

2.5 INFORMATION LIFE-CYCLE

As already discussed earlier in this chapter, an interdependent relationship exists between the concepts of data, information and knowledge - each being a building block for another. According to Spiegler (2003) this relationship, (depicted in Figure 2.2 earlier in this chapter), defines a cycle, a life-cycle of knowledge creation. If one accepts Spiegler's (2003) parallel inference that data becomes information when value is added, and information becomes knowledge when insight, abstraction and better understanding is added (Spiegler, 2003:535), then the author can deduce that information can also be created through a similar life-cycle, starting with the generation of data. Debons (1988) stipulates that this life-cycle or system makes it possible for data to transform into information. It is also important to note, that this information life-cycle or system, can become a knowledge life-cycle or system, depending on the level of understanding of the user.

The author will firstly discuss the information life-cycle. As can be seen in Figure 2.7, the life-cycle is a 7-stage process. Firstly, information is *generated* by an individual human being as part of their general daily activities. This process takes place within the mind of the user and, thus, already consists of data plus added value, resulting in information. In the following process, this information can be taken out of the mind of the user, making it data without the added value of interpretation and context and, thus, is represented as

data. The data may be *gathered* in various formats, including text and electronic formats. The following step in the life-cycle is when the data is *organised*. Data is organised according to the needs of the user. The fourth step in the process is when data is *stored*. During this step the life-cycle can be extended when it is stored in libraries or electronically on the internet. It is important that the data is stored is a format that will assist in the following step, the *retrieval* thereof. The second-last step is the *distribution* of the data. In today's electronic world there are many new forms of electronic distribution methods and technologies. The last step in the cycle is the *use* of the data. If the data is understood and meaning can be added, then the data will be used and becomes information. However, if the data has no meaning at all, then the data will remain data.

The information-data-information cycle may also be part of the knowledge-information-knowledge life cycle. The knowledge-information-knowledge cycle is associated with a human being and the cognitive level of the particular individual. Debons (1988:7) explains that this cycle takes place within human social networks, where the goal is to increase the sum of human wisdom. For example, a scientist in a specific field derives data from theories and experiments, leading to information about specific events. This information is shared by documenting and publishing it in scholarly journals, and others are informed. This relates to the information life-cycle, but as other scientists grasp this understanding of the phenomenon, and decide on further research, the life-cycle would repeat itself, this time already starting from a value added concept, and this relates to the knowledge life-cycle.

In the following figure, compiled by Van Deventer (2003), these life-cycles are indicated.

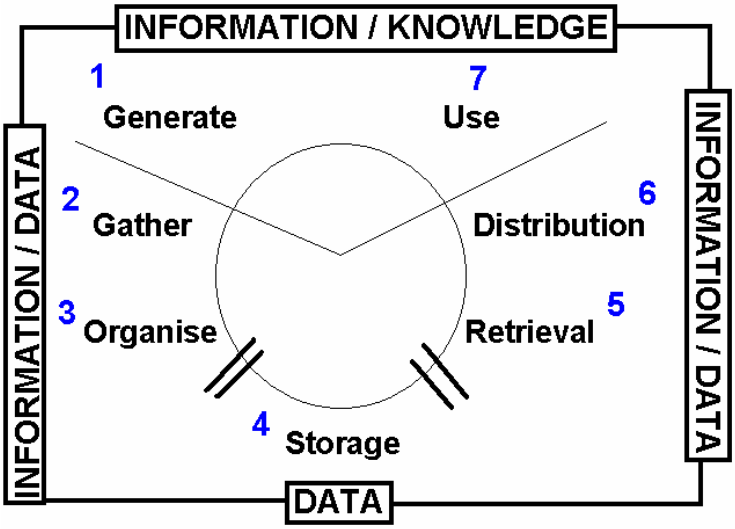


Figure 2.7: The life-cycle of information and knowledge

The author is of opinion that the life-cycle of information, as discussed above, is of particular importance in the context of this thesis. Viewed from a local knowledge perspective, step 1, 2, 6 and 7 of the information life cycle is important to the central problem statement of this thesis as these steps can aid a country to become an information and knowledge society. During Step 1, the *generation* of information, local information can be generated by local people for example local remedies to illnesses. During step 2, this locally generated information can be *gathered* in various formats, including text and electronic formats. The generation, gathering and capturing of local information and knowledge is very important for a country to become an information and knowledge society as this is one of the indicators of the knowledge criteria of the information and knowledge society. These indicators will be discussed in detail in chapter 4. During step 6 and 7 in the life-cycle of information, information is *distributed* and *used*. The distribution and use of local information is also important for a country to become an information and knowledge society, as the cultural heritage of a country forms part of this information. This heritage can thus be distributed through for example digital libraries and in this way generate cultural diversity which refers to the cultural criterion of the information and knowledge society. This criterion will be discussed in detail in chapter 3. Through the distribution of this local

information other people will be enabled to use this information and thus benefit from the local information of others.

Vickery & Vickery (1992) elaborates on the above mentioned life-cycle by including many social activities within his so-called information system. This system can be seen in the following figure:

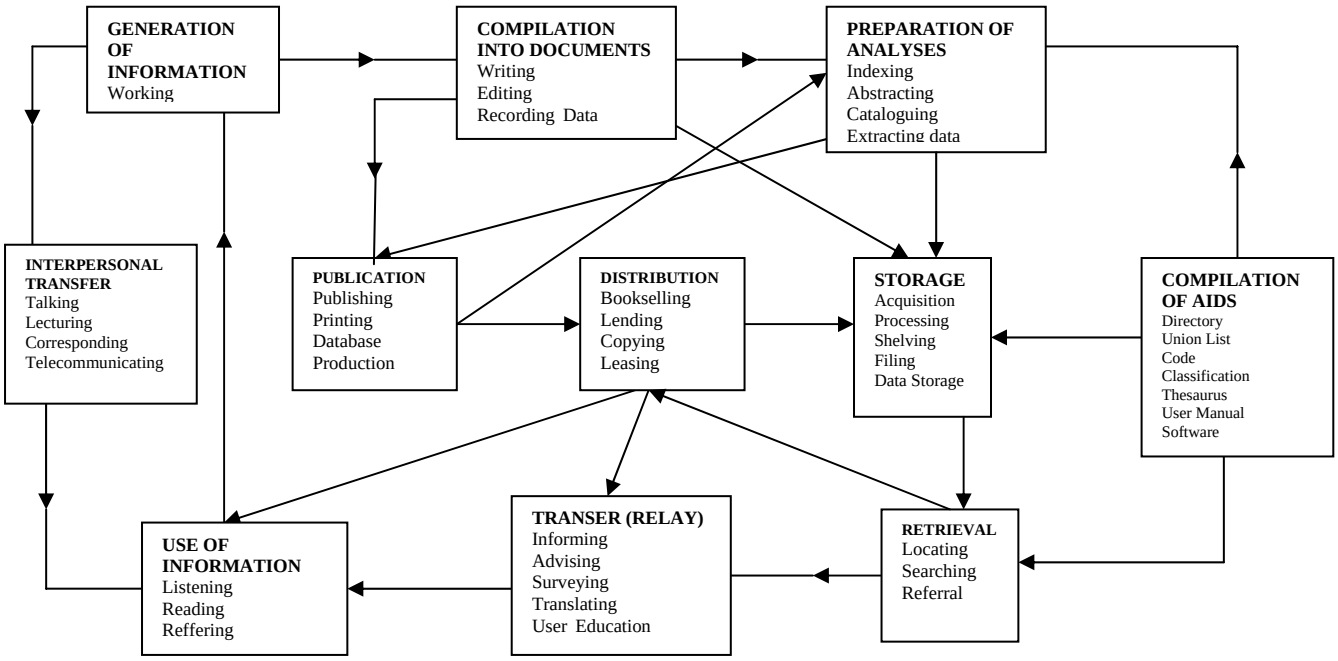


Figure 2.8: Vickerys' Information System

Within this information system, the direct and indirect flow of information can be indicated. This flow of information will be discussed in the following section and with the help of Figure 2.9.

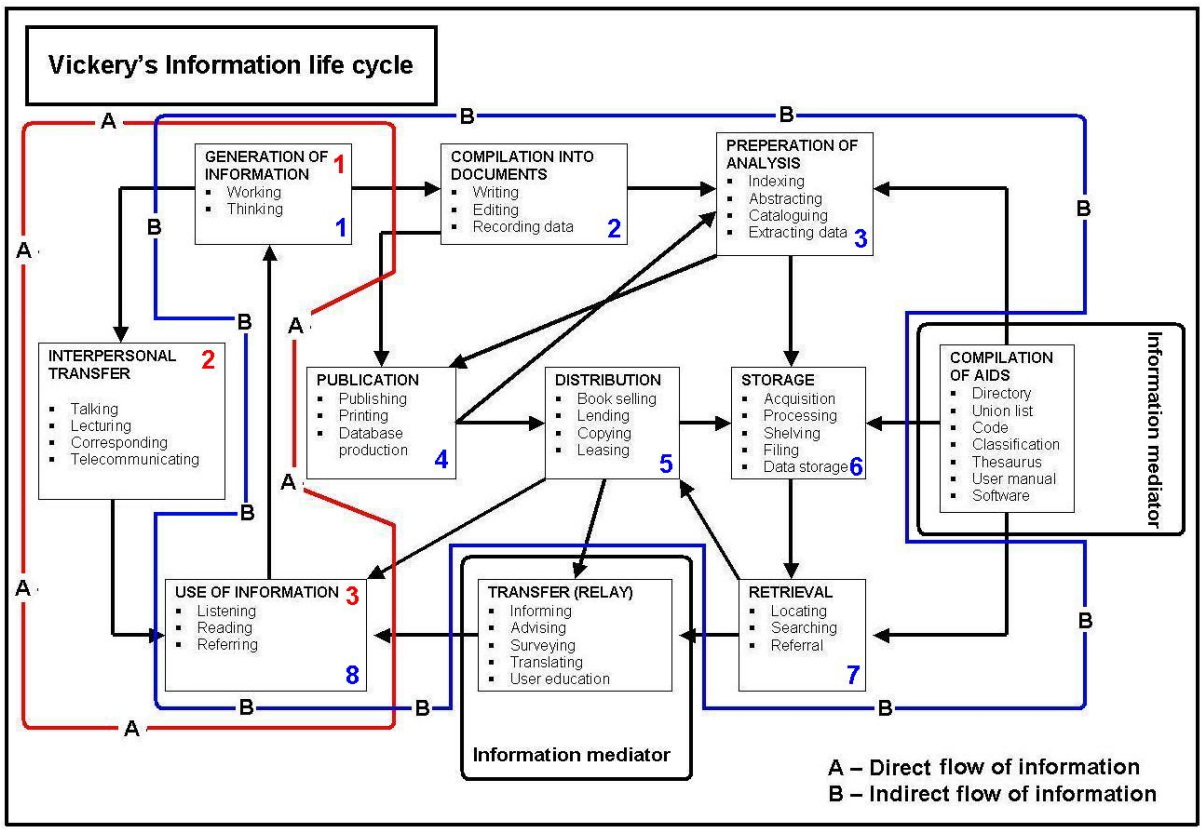


Figure 2.9: Vickery's flow of information

A refers to the direct flow of information. The steps in this cycle are identical to the corresponding steps in the simplified information life cycle (Figure 2.7). The direct flow of information occurs between two people. Firstly the generation of the information, through working and thinking. Secondly, the generator transfers the information to another individual through the use of interpersonal transfer, by, for example, talking or corresponding. The final step in this cycle is when the recipient uses the information for reading or referring or whatever purpose.

B refers to the indirect flow of information within the information system. The cycle starts at the same step as the direct flow of information, namely the generation of the information. However, the second step in the indirect flow is B2, the compilation of the information into documentation for the purpose of later distribution. At the third step in this cycle, B3, the information is prepared for analysis. However, after the document is prepared for analysis, it may be stored immediately; removing the requirement of publication and distribution,

or the normal route of B4 and B5 may still be followed. B4 refers to the publication of the information resources. When the document has been published, it may be either distributed, or it may be returned to the point of preparation for analysis, depending on the requirements of the document. B5 refers to the distribution of the information resource to possible users which is followed by step B6 - the storage of the information resources for further usage at a later date. From the stored resources the information is then retrieved in step B7. After retrieval of the information resource, the resource may be distributed, such as in the case of booksellers. B8 refers to the usage of the information resources by a particular user, or groups of users. The Transfer/Relay and Compilation of Aids (information mediator) may be excluded from the life-cycle. They aren't necessary for the functioning of the life-cycle, but they can assist in the effective functioning of the cycle. The mediators merely assist in information transfer.

Vickery & Vickery's (1992) information system is far more elaborate than the basic information life-cycle (Figure 2.7), but the indirect flow of information only focuses on the written information that is possibly published and sold. It is the author's opinion that this life-cycle can further elaborated if modern day ICT is taken into account. For example, steps B5 and B6, the distribution of information and the storage thereof, are greatly extended with modern ICT. Information in digital format can be stored for a far longer time than information in a paper format, thus increasing the lifespan of the specific information.

Due to its electronic nature, this information can also be re-produced an infinite number of times and be distributed via electronic methods such as email, the internet, ftp servers, bloggs, etc. making it far more accessible for developed communities, who, in turn, can make use of this information to stimulate further knowledge creation. Developing communities, however, that have very little or no physical and/or ICT infrastructure, cannot benefit from this extended lifespan of ICT orientated information because they do not have the access to it. Seen from this perspective, developing communities would then experience limited knowledge creation as there is very little or no transfer

and exchange of data and information between their tacit knowledge and the explicit knowledge available in electronic format on for example the internet. This argument will be explored further in chapter 5.

2.6 CONCLUSION

This chapter has provided the reader with a brief historical perspective of the Information Science domain and provided the reader with a better understanding of the concepts data, information and knowledge, as used within the domain of Information Science but also as applied in this thesis, by redefining the traditional concepts from the perspective of this thesis. This chapter further clarified the concepts: global-, western-, and scientific knowledge as well as indigenous-, traditional-, and local knowledge as these concepts form the foundation on which the thesis is grounded. The relationship between the concepts, data, information and knowledge as well as the relationship between information and development was discussed by the author as these relationships are pivotal points of the thesis.

The author concluded this chapter with a discussion on the life-cycle of information and discussed how modern information communication technologies have changed the nature of processes within this life-cycle as well as extended the life span of information. Developed communities who have access to modern ICT infrastructures benefit from this extended life span of information and further knowledge creation is stimulated. In contrast to this, developing communities cannot benefit from this extended life span of information because they do not have the technological means. Seen from this perspective, further knowledge creation within developing communities is not stimulated. This poses additional barriers for developing communities to overcome on the road to the information and knowledge society. These barriers will be discussed in chapter 5.

In the following chapter, the author will discuss the concept of the information and knowledge society, by taking a closer look at the evolution of this concept. Criteria and characteristics of the information and knowledge society

will be discussed and the author will investigate the potential advantages as well as disadvantages associated with becoming an information and knowledge society.

PART II: THEORETICAL FOUNDATION (Part 2)

CHAPTER 3

THE INFORMATION AND KNOWLEDGE SOCIETY

3.1 INTRODUCTION

The twenty-first century is characterised by new prospects and challenges posed by the development of the information and knowledge society. This is a society that is transformed by the use of information and communication technologies (ICT's), and where these technologies are utilised by developed countries as a positive tool for development. Unfortunately, many developing countries cannot benefit from this tool due to numerous obstacles and barriers. Developing countries and communities cannot become information and knowledge societies, and gain value from the benefits offered by these societies, due to these barriers. These barriers and obstacles will be addressed in this thesis.

In recent times, much has been documented about the global information and knowledge society. It is important to gain a better understanding of this concept in order to appreciate the value and importance of being part of such a society. For this reason this chapter will investigate the very nature of an information and knowledge society.

Firstly, the term information and knowledge society needs to be defined and a closer look needs to be taken at the evolution of this concept. Secondly, the criteria and characteristics of the information and knowledge society that can be used by countries and communities to judge their status on the path towards becoming an information and knowledge society will be discussed. The author will further investigate the potential advantages as well as disadvantages associated with becoming an information and knowledge society. The chapter will be concluded with a discussion on the impact that

greater access to information, due to participation within the information and knowledge society, has on various aspects of life such as the manufacturing industry, business and finance, education and training, medicine and health.

3.2 EVOLUTION OF THE CONCEPT INFORMATION SOCIETY.

According to Martin (1995:2) the concept of the information society emerged in the 1970's and throughout the 1980's it rapidly gained widespread currency. In contrast to this, Dordick & Wang (1993:8) are of the opinion that the information society was already dimly perceived in the early writings of observers in Japan, who often talked about a "new" world in which material values were to be replaced by more spiritual ones. In the 1960's there were already several versions of how the continuation of the Industrial Revolution to its natural and historical conclusion would lead to a post-industrial society. One image of such a post-industrial society was to be the information society (Bell, 1974; Webster, 1995).

Cilliers (1987:13) is of the opinion that it was Fritz Machlup, the economist, who proposed the idea of an information society within an economic paradigm, in his 1962 work, '*The production and distribution of knowledge in the United States.'* In 1972, a non-profit organisation called the *Japan Computer Usage Development Institute*, presented to the Japanese government the Plan for the information society - a national goal towards the year 2000. The plan was developed as a model for the realisation of Japan's information society towards the year 1985.

In 1974, Daniel Bell discussed the drop in manufacturing and agriculture industries and the rise in services with information as the main component in the coming post-industrial society. In 1975, it was Edwin Parker and Marc Porat from Stanford University who confirmed that the information society was really approaching. Anthony Debons suggested (in 1981) that there were about 1,6 million information professionals in the United States, confirming that the United States was already part of the information society. In 1985, Gleave (Cilliers, 1987) pointed out that besides the 30 000 librarians in the

United Kingdom, the major growth in the information society was provided by publishers, authors and editors. At this point the idea of the information society was already firmly embedded in literature and used by many authors as reason for changes in societies.

It can clearly be seen that this notion of the information society is not new, but can be traced back to the early 1960's when scholars such as Machlup and others started to speak about a post-industrial society which embodied the same ideas as that of the current understanding of the information and knowledge society.

In the following section, the concept of the information and knowledge society will be defined and the question will be addressed whether these two concepts should be used interchangeably for one another or as two separate concepts.

3.3 DEFINING THE CONCEPT INFORMATION AND KNOWLEDGE SOCIETY.

The ways in which the concept of the information and knowledge society has been expressed in literature has attracted a fair amount of criticism, usually on the grounds of ambiguity or unsuitability. To compound the problem of defining the concept of information society even further, many authors use this concept interchangeably with the newer concept of knowledge society (Lor & Britz, 2007). To see how the concept of the information and knowledge society has evolved over time, this section will start with definitions of the information society found in older Information Science literature and then compare them to more recent definitions of the information society that include knowledge society, found in more recent literature.

Webster (1995, 2002) remarks that criticism and suspicions about the concept of the information society are mainly found in Social Sciences and that many authors use the concept information society without any such problems (Toffler, 1980; Hamelink, 1986; Theobald, 1996; Nassimbeni, 1998; Brown &

Duquid, 2000; Martin, 1988 & 1995). For this reason it is believed that the phrase 'information society' has lost its meaning through overuse (Martin, 1995; Harris, 1999; Webster, 2002).

A further point of criticism is that very few operational definitions of the concept exist, which makes it very difficult to decide whether a country or community has moved towards becoming an information society or not (Nassimbeni, 1998). To address this problem, the author will provide a more operational definition for the concept information and knowledge society later in this chapter, based on the context of this thesis.

The following definitions where chosen from older Information Science literature, as they provide useful pointers to aspects that need to be considered in the exploration of the concept.

More than three decades ago, Bell (1974:20) defined the information society as a society that is organised around knowledge for the purpose of social control and the directing of innovation and change. In other words, a knowledge society that acknowledges the power that knowledge can have and that can direct change and innovation.

A decade and a half later, Martin (1988) defined the information society as, "a society in which the quality of life, as well as the prospects for social change and economic development, depend increasingly on information and its exploitation. In such a society, living standards, patterns of work and leisure, the education system and the market place are all influenced markedly by advances in information and knowledge" (1988:42). This, in other words, is a society where information and knowledge is regarded as essential for survival; physically, mentally and economically.

The most operational definition found in the older Information Science literature was in Shillinglaw (1988:12) who simply defines an information society as a society in which the majority of the workforce is engaged, not in the production of manufactured goods, but in the processing of information.

The term is used here to characterise a situation where information is the new premise for the production and creation of knowledge, unlike the tangible resources of the Industrial Society (Toffler & Toffler, 1995).

In 1995 the Finland Council of State, defined the information society as, “a society which makes extensive use of information networks and IT, produces large quantities of information and communication products and services and has a diversified content industry,” (McColgan, 1996). This definition is one of the more operational definitions found. Thus, it explains a society that makes extensive use of information communication technologies in order to produce related products and services for a content-based industry.

More recently, the following definitions were tabled at the World Summit on the information society in Geneva (WSIS, 2003):

- a society in which people interact with technology as an important part of life and social organisation, to exchange information on a global scale;
- a society influenced and impacted by the changes taking place in the ICT sectors;
- the term refers to the new social-economic and technological paradigm likely to occur, as a result of an all-embracing process of change that is currently taking place;
- a society in which advanced technologies are used to improve living and working conditions for all citizens;
- the information society is a term that has been coined to describe a modern population that is conversant with – and reliant upon – information and communication technology;
- a society where the creation and exchange of information is the predominant social and economic activity;
- the acquisition, storage, processing, transmission, distribution and use of information and knowledge.

To summarize, it is possible to extract the following important points from the above definitions:

- the importance of information and the creation of knowledge (Nassimbeni, 1998);
- the importance of information and communication technologies in terms of the improvement of working and living conditions (WSIS, 2003);
- the importance of social change in the information society and that it is applied information that can direct the society to these changes (Martin, 1995; Bell, 1974);
- the use of information networks for the disseminating of information (McColgan, 1996; Toffler & Toffler, 1995).

The newer concept of knowledge society is also used by many authors (Drucker, 1998; Evers, 2000; Smith, 2002; Servaes *et al*, 2003) in a rather ambiguous way and is similar to the use of the concept information society. According to the World Summit on the Information Society (WSIS, 2003) the concept knowledge society has become a 'fashionable' concept increasingly replacing the so-called 'information society'. In discussing Africa as a knowledge society, Lor & Britz (2007) supports writers such as Smith (2002) and Webster (2002) who assert that, "information and/or knowledge societies are characterized as societies where information and knowledge have become the most important production factor and where there is a culture of knowledge production underpinned by a higher level of education," (2006:2).

Lor & Britz (2007) stipulate that the main difference between an information and knowledge society can be explained as a shift in emphasis that took place. This shift in emphasis is explained by way of the following table (Lor & Britz, 2007):

Information society	**Knowledge society**
Information and communication technologies	Knowledge technologies (e.g. collaboration software)

Collection	Production
Dissemination	Analysis, evaluation
Packages	Content
Measurement	Judgment
Facts	Texts
Outputs	Outcomes
Quantity	Quality
Reliability	Validity
Accuracy	Truth, trust

Table 3.1: Shift in emphasis from the information to the knowledge society

Accordingly, Lor & Britz (2007) define a knowledge society as, "a society that operates within the paradigm of the economics of information. It values human capital as the prime input to production and innovation. A knowledge society is well connected via modern ICT's to the dematerialized economy, and has access to relevant and usable information. A highly sophisticated physical infrastructure underpins this economic model and allows the delivery of the material objects that are accessed and manipulated in the dematerialized world of modern ICT's." (2007:4).

From this definition, the author can deduce the following similarities between the information society and the knowledge society:

- As with an information society, the knowledge society also operates within the paradigm of the economics of information, as defined by Machlup (1962). This new economy of information will be addressed in greater detail in the discussion pertaining to the economic criterion of the information and knowledge society.
- As with an information society, the knowledge society is well connected by means of modern ICT's (as per Martin's definition of an information society, 1988:42).
- As with an information society, the knowledge society is reliant upon and utilises relevant and useable information (WSIS, 2003).

The author is of the opinion that the definition of the knowledge society of Lor & Britz (2007) is one of the most comprehensive definitions, as it captures the essence of an information and knowledge society as well as elaborating on the physical infrastructure a country or community needs if they want to become an information and knowledge society. These elements are lacking in other definitions. Other definitions of the information and or knowledge society (Toffler, 1980; Hamelink, 1986; Theobald, 1996; Nassimbeni, 1998; Brown & Duquid, 2000; Matin, 1988 & 1995, Webster, 1995, 2002), only concentrate on the information infrastructure and do not even mention the fact that an information and knowledge society is reliant upon a physical infrastructure necessary for the delivery of material objects.

It is further the opinion of the author that the knowledge society can be regarded as being similar to that of the information society, and that the shift in emphasis that Lor & Britz (2007) suggest can take place once the primary goal of reaching the information society has been achieved. For this reason the author sees the knowledge society as being more advanced than the traditional view of the information society but postulates that the two concepts are interdependent upon each other. Thus the author is of the opinion that the two concepts should not be used in isolation of each other but as a conjoined concept, namely, an information and knowledge society.

From the perspective of this thesis and with the above argument in mind, the information and knowledge society can be defined as follows:
A society that is reliant upon a sophisticated physical and ICT infrastructure for the improvement of everyday living and working conditions. A society that values the importance of information as a key to economic wealth and prosperity and where there is an increase in information related activities, as well as an enhancement of human intellectual capability. The information and knowledge society ensures the freedom of information through the use of information and communication technologies. In such a society, modern information and communication technologies are utilised to achieve the interaction and exchange of information between their local knowledge system (tacit knowledge and explicit knowledge) and the global knowledge

system (explicit knowledge) to create usable, relevant contextualised content and knowledge. This interaction and exchange of data information and knowledge will, in turn, ensure the respect of other people's beliefs, values, norms and religions due to the increase, and availability, of information regarding these aspects.

Thus, firstly, an information and knowledge society relies upon an elaborate physical transportation infrastructure, consisting of roads, trucks, warehouses, railways, airports, harbours, and similar such items. As mentioned, this physical transportation infrastructure is often overlooked and underemphasised but it is crucial for the effective and efficient delivery of products and services.

Secondly, a sophisticated information and communication technology infrastructure, consisting of telecommunication cables, computers, servers and hosts, and internet service providers, is vital to facilitate the exchange and interaction of data, information and knowledge from the community's local knowledge systems and the global knowledge system.

Thirdly, within an information and knowledge society, information is regarded as having economic value and can be utilised to promote human development in areas such as health, education, social services and commerce. This would lead to an increase in human intellectual capability and can lead to the improvement of daily working and living conditions.

Fourthly, the use of modern information communication technologies within the information and knowledge society, will lead to the freedom of information that can lead to a political process characterised by increased participation in the political arena by citizens. This can be achieved through applications such as e-government, where the government is made more citizen-centred by providing citizens with easy access to accurate, consistent, and timely government information.

A fifth point is that within the information and knowledge society, the exchange of data, information and knowledge is a constant process of interaction and exchange between the countries localised knowledge and the global knowledge system. The community's local knowledge is unique to their specific culture and is the basis for their local decision-making and problem solving in areas including, but not limited to, agriculture, health care, food preparation, education and natural resource management. This local knowledge is mostly tacit and exists in the mind of the local people but can also be explicit when this local information has been codified and put into an electronic format. The global knowledge system consists of knowledge that is beyond local and indigenous context and is explicit, as it is usually information in digital form. Hence, it is information that is not found locally, but more importantly, information that is not found within the developing community's context and possibly understanding. Information from the global system thus has to move from being outside of the local community's context to their local knowledge system where it is processed and contextualised so that it can be understood and used to improve the living and working conditions of the community.

It is also important that information from the community's local knowledge system can move and be represented in the global knowledge system. This is important for the global recognition of the local community's knowledge, as this knowledge strengthens the community's economic situation, based on self-sufficiency, but also in terms of moral values, and local culture among community people. In the globalised world, it is certain that most of the content of the internet will focus on Western ideas, knowledge, and culture. However, if nothing is done to promote the learning of local knowledge, future generations will definitely not understand where they are in the world, and perhaps lose the roots of their culture (Nanzhao, 2001).

Lastly, through this interaction and exchange, the increase and availability of information about other peoples' cultures, norms, beliefs, and religions is improved, and this can lead to a mutual respect for each other.

In the following section, the author will address whether this concept of the information and knowledge society, already so embedded in literature, is a myth or a reality. If this concept is not a myth, then developing countries and communities need to strive for this reality by complying with the criteria for becoming an information and knowledge society that will be addressed later in this chapter.

3.4 THE INFORMATION AND KNOWLEDGE SOCIETY – A REALITY CHECK

Hamelink (1986:7) defines a myth as a story through which the world is explained to us. When confronted with a myth, the reader should scrutinise its contents on two levels: realism and ideology. In other words - can the content of the myth stand up to reality? Hamelink (1986:7) is of the opinion that the whole idea of the information and knowledge society is a myth, and that this powerful myth is told very persuasively by numerous authors (Martin, 1988; Martin, 1995; Bell, 1974; Debons, 1988), but when confronted with reality would not be able to stand up. Hamelink (1986) charges that the myth of the information and knowledge society has three dimensions:

- Economic;
- Political;
- Cultural.

These dimensions and Hamelinks' (1986) points of criticism against them will be discussed in the following section.

3.4.1 Economic dimension

Within the economic dimension, there are two aspects that need to be addressed. Firstly, Hamelink (1986:7) states that the myth suggests that the information revolution is the most significant historical development of our time, a radical transition to a fundamentally different age. The most important aspect of the myth is the perception that we are entering a revolutionary

different stage of human history and development. Secondly, the information and knowledge society is a "post-society" (Hamelink, 1986). It breaks with prior values, social arrangements, and methods of production.

According to Hamelink (1986) the myth of the economic dimension, lies in the fact that the information and knowledge society does not imply a fundamentally new way of organising the economy, but rather another (albeit recently emerging) form of capitalist society. Hamelink (1986) argues that technological upheavals (however profound) in the production process do not immediately indicate a passage from capitalism, but rather is a way in which capitalism renews itself. Although obscured through the presentation of these 'new ideas' about economic organisation, this represents a remarkable and crucial continuity, not evidence of a revolutionary new and different information age.

In terms of the second aspect of the economic dimension, Hamelink (1986) is of the opinion that there is no evidence signalling the decline of industrial production or rise of a service economy, thus the idea of a shift from industrial production to the provision of services, is a myth. Hamelinks relies on the World Bank Development reports, and argues that the service sector is still highly dependant on industrial production and could not survive a de-industrialised economy.

This shift from industrial production to the provision of services is supported by other authors such as Toffler (1980) and Clark (2003). The so-called "wave" theory of Alvin Toffler (1980) supports this notion by viewing history as a succession of rolling waves of change. When a "new" wave hits a society, it results in changes in social arrangement, modes of production, organisational structures and even changes in the work force. According to Toffler, the factors of production in the second wave (industrial era) were tangible objects, for example, land, labour, raw materials and capital. In contrast to this, the factors of production in the third wave (information era) will be intangible objects, for example, data, information and even knowledge (Toffler, 1980). According to Clarke (2003) this has made possible a dematerialised and

weightless economy. (Clarke, 2003:1). Within the information and knowledge society, the internet, specifically the World Wide Web, is a manifestation of the new economics of information (Britz *et al*, 2006).

3.4.2 Political dimension.

As per the second dimension of the myth, the political arena of the information and knowledge society is participatory. Its decision-making is decentralised and it insists on greater access to information by and for all its citizens. Information will be available to all people and this results in the notion that information equals power.

Authors such as the sociologist Anthony Giddens support this aspect of the information and knowledge society. Giddens is a proliferate writer on the social and political nature of globalisation, the effects of globalisation and the information society. In his book, *The Third Way*, Giddens (1998) discusses the so-called blue-print of governing in a globalised world of social change - an information society. This method is better known as the 'third way' and has become a subject of global political interest. The philosophy rests on three cornerstones. Firstly, the idea that government must provide equal opportunity for all. Secondly, that there is "an ethic of mutual responsibility that equally rejects the politics of entitlement and the politics of social abandonment," and thirdly, that there is a new approach to governing that empowers citizens to act for themselves (Democratic Leadership Council Event, 1999).

Hamelink (1986) pursues the idea that the political arena of the information and knowledge society being participatory is a myth, as well as the notion that everybody should have access to information and that everyone will be able to own information. Hamelink attempts to prove that this is a myth due to a number of factors that militate against this statement:

1. In certain social sectors, information is becoming increasingly complex and specialist. Despite an increased volume of available information, more people know less. This notion is supported by Theobald (1996)

who states that when information doubles, knowledge halves and wisdom quarters.

2. The resource 'information' is far more difficult to exploit than land or capital. It demands highly developed intellectual and managerial skills, which are very unevenly distributed in society. The concept 'information rich' versus 'information poor' is supported by various authors (Thapisa, 1996; Theobald, 1996; Nassimbeni, 1998, Rash, 2001; Shibanda & Musisi-Edebe, 2000).
3. Advanced hardware and software for information-processing are expensive and can be afforded only by land or capital owners. The rest will have to catch up using obsolete equipment. Joseph Kiplang'at (1999) disagrees with this point and argues that the cost of virtually all information technology components has plunged. The real cost of computer hardware has dropped an average of 20% a year, for over 40 years and computer power per unit cost has increased tenfold every four or five years (Hanna, 1991). Although this is still very expensive for developing countries and communities, this is a step in the right direction, and lower cost information technology components are even being developed. An example of this is the $100 personal computer that was launched by Linux, in 2004 and is called the SolarLite. The SolarLite was created to offer an ecologically and economically viable method to provide information to billions of disadvantaged people around the world (SolarPC, 2005).
4. Furthermore, the assumption that information equals power is also part of the myth. Information becomes a source of power only if the necessary infrastructure for its production, processing, storing, retrieval, and transportation is accessible. Chisenga (2000) is of the opinion that this "source of power" is so important to countries that it has led to the formation of the National Information Infrastructure (NII) in America. Since leaving the White House, former President Clinton has been committed to the creation and development of such an infrastructure.

5. The notion that everybody will have access to information is also a myth due to the fact that the control over, and access to, advances in information technology are very unevenly distributed in the world. This notion is the information technology equivalent of the 'information rich' 'information poor' scenario. It is referred to as the 'digital divide' and is addressed by many authors including Thapisa (1996), Theobald (1996), Nassimbeni (1998), Rash (2001) and Shibanda & Musisi-Edebe, (2000).

3.4.3 Cultural dimension

Hamelink is very critical of the notion that the modern information society will lead to less work for all humans. Within the third dimension of the information and knowledge society myth, the misery of labour is taken away from the human being and replaced by the electronic system. Hamelink focuses on the concept of power and states that technical progress does not necessarily correspond to the improvement of the quality of life. He argues that ICT strengthens the existing control of the "rulers" over the "ruled" rather than providing an equalitarian society. Furthermore, Hamelink argues that if hard labour is taken away from humans by electronic machines, existing job opportunities are also taken away.

It is the author's opinion that this is only one side of the coin, and that attention should also be paid to the flipside. Work opportunities are not being taken away from people. People will always have work to do, even in the information and knowledge society; the level of skill required for this work is just different than in the industrial society (Toffler, 1980). Lor & Britz (2007) stipulate that skilled people are a precondition for progress towards an information and knowledge society. This idea is also supported by Toffler (1980), who is of the opinion that the low skilled, interchangeable muscle work of the industrial era will be replaced by high skilled, non interchangeable 'brain' work, in the information era.

From the above discussion, it can be deduced that the information and knowledge society is not a myth, but a reality for which countries and communities should strive. Although Hamelink (1986) poses relevant concerns and points out certain limitations of the idea of an information and knowledge society, it is not such an unreachable goal as he suggests. Despite Hamelink's (1986) concerns listed above, the reality is that it is a concept that has in recent years been very high on the political agenda of Western and African countries (Van Audenhove *et al*, 1999). In South Africa, the former Minister of Telecommunication (Naidoo, 1998), summarised the importance of the information society as follows: "The information society is not an impossible dream; neither is it a sophisticated nicety. It is fundamental to the upliftment and the improvement in the quality of life of all the disadvantaged people of the world, to ensure that future generations do not suffer from the same disadvantages and that the principle of equal opportunities prevails."

In the following section, the author will discuss criteria for the information and knowledge society that can be deduced from the authors' own definition of the information and knowledge society, as well as criteria found in literature.

3.5 CRITERIA FOR THE INFORMATION AND KNOWLEDGE SOCIETY

As indicated whilst defining the concept information and knowledge society, one of the problems identified is that very few operational definitions of the concept of information and knowledge society exist. This makes it very difficult to decide whether or not a country or community has moved towards becoming an information and knowledge society (Nassimbeni, 1998). To try and alleviate this problem, authors such as Martin (1995), Webster (2002) and Britz *et al*, (2006) suggest certain criteria that have to be in place for a country or community to become an information and knowledge society. These criteria are only intended to act as guidelines for the reader to assess countries for information and knowledge society status. The criteria can be applied to countries and, if the specific country meets the majority of these criteria, then it can be deduced that the specific country is included within the

information and knowledge society. If most, or all, of the criteria are not met by a specific country, as in the case with most developing countries, then it can be concluded that the specific country is not on the path to becoming an information and knowledge society and can accordingly not benefit from the advantages of being included within this society.

In the following two chapters, the author will apply these criteria on developed as well as developing countries to discover whether they can be viewed as information and knowledge societies. Authors such as Thapisa (1996), Theobald (1996), Nassimbeni (1998), Van Audenhove *et al* (1999) and Shibanda & Musisi-Edebe (2000) refrain from listing criteria – as it is very difficult to set criteria if there is no operational definition for the concept, as has been discussed earlier. They do supply, however, information on what is needed by countries to become an information and knowledge society and the author has included this information under the appropriate headings. Additional criteria will also be added to that of Martin (1995), Webster (1995, 2002) and Britz *et al* (2006).

Further, it is important to discuss the criteria because if a developing country or community does not meet the specific criteria, then this failure becomes a barrier that the country or community would have to overcome if they want to progress towards becoming an information and knowledge society. These barriers will be discussed later in the thesis. The following definition of an information and knowledge society, as previously discussed, will act as framework from which the specific criteria will be construed:

A society that is reliant upon a sophisticated physical and ICT infrastructure for the improvement of everyday living and working conditions. This society values the importance of information as a key to economic wealth and prosperity leading from an increase in information related activities, as well as an enhancement of human intellectual capability. The information and knowledge society ensures the freedom of information through the use of information and communication technologies. In such a society, modern information and communication technologies are utilised to achieve the interaction and exchange of information between their local knowledge

system (tacit knowledge & explicit knowledge) and the global knowledge system (explicit knowledge) to create usable, relevant contextualised content and knowledge. This interaction and exchange of data information and knowledge will, in turn, stimulate mutual respect of other people's beliefs, values, norms and religions due to the increase in, and availability of, information regarding these aspects.

Thus, the following criteria can be deduced from this definition:

- economic criterion;
- spatial & technological criteria;
- political criterion;
- social criterion;
- cultural criterion;
- physical infrastructure criterion;
- knowledge criterion.

3.5.1 Economic criterion

Although there is much more to the information and knowledge society than the means by which it earns its living, the economic stability of a society is of the utmost importance. In the information and knowledge society, information is seen as key economic factor, as a resource, service, commodity, a source of added value and employment (Martin, 1995). This economic aspect of the information and knowledge society is supported by authors such as Britz, *et al* (2006) and Fritz Machlup (1962). According to Britz *et al*, (2006) knowledge has become the primary input in economic activities within the information and knowledge society, resulting in a new economy of information. This is an economy where modern ICT's have made it possible for information to become unbundled from its original physical carriers, allowing information to travel by itself and, thus, making it possible for more people to reach information and be reached and exposed to more information. This new economics of information is significantly different from the old economic paradigm and has opened a window of opportunity for developing countries.

Machlup (1962) investigated the economic aspects of information in his book, *The production and distribution of knowledge in the United States.* He also devoted much of his professional life to the goal of assessing the size and growth of the information industries. Webster (2002) is of the opinion that there is an established sub-division of economics, which concerns itself with the 'economics of information'. Drucker (1969: 249) argues that, "we have evolved into a society where the distinguishing characteristic is that knowledge and organisation are the prime creators of wealth." Thapisa (1996:76) concludes that the next challenge will be to achieve high information economy growth rates. This means "investing in the education and development of its people, instituting macro-economic stability, introducing market-oriented economies, opening trade and investment regimes, establishing access to world markets, creating the right structures of incentives and the proper functioning of capital, financial and labour markets," (Choksi, 1995).

Thus, it can be seen that within an information and knowledge society, information is regarded as having economic value and can be utilised to promote human development in areas such as health, education, social services and commerce. This would lead to an increase in human intellectual capability and can lead to the improvement of daily working and living conditions. A new economy of information is present where information and knowledge are utilised as the new factors of production for the creation of wealth. What is needed within a society to achieve this?

Firstly, the author is of the opinion that for the above to be realised, a strong economy with a high GDP and low inflation rates is needed in which the citizens will have a good quality of life. For development to be successful, it is important that the community's basic physiological needs are met, for example, the need for food, shelter, and money is needed to attain this. This argument is supported by Maslow (1970), who is of the opinion that the most basic human needs are physiological and take priority. Generally, these consist of the need to breathe, eat and anything else that is important for us to survive.

Within a stable economy, the unemployment rate is very low, and the majority of the population live above the poverty line. This correlates with the WSIS, Declaration of Principles, wherein they state that one of their challenges in building a successful information and knowledge society is the eradication of extreme poverty and hunger. Within an information and knowledge society, there will be no extreme poverty or hunger, and this can only be achieved within a strong and stable economy.

Furthermore, the author is of the opinion that the interaction and exchange of data, information and knowledge between the countries local knowledge system and the global knowledge system can help to alleviate the extreme poverty and hunger and can be utilised to promote human development in areas such as health, education, social services and commerce. Although information and communication technologies are only a tool for development, ICT's can be utilised to achieve the information exchange and this, in turn, can lead to the improvement of daily working and living conditions. For example, one community may have specific data, information and knowledge concerning local methods that can be used to purify water. If this knowledge is exchanged and made available through the global knowledge system, other local communities may be able to access this information, where it may be useful for other communities struggling with the same issues. In this way, information is used as a resource, a source of added value that can open many windows of opportunity especially for developing communities, which are still on the path toward becoming an information and knowledge society.
In the following chapter, this criterion will be applied to the developed countries Norway and the USA and, in chapter 6 on the developing countries, Niger and South Africa, to see if they comply with the criterion and can be viewed as information and knowledge societies. A further point of importance is that the economic criterion – a strong and stable economy where information is regarded as a resource and a source of added value and employment - underlies all the other criteria. Money is needed to establish a sophisticated ICT infrastructure which, in turn, underlies criteria such as the social, cultural, political and knowledge criteria. These criteria will be discussed in more detail in the following sections.

3.5.2 Spatial & Technological criteria

Not unexpectedly, the ICT requirement for the development of an information and knowledge society, is very extensive and sophisticated. This relates to the criterion for the information and knowledge society discussed by Webster (2002), namely the spatial criterion. Physical location is no longer a barrier to access information through the use of remote access and networks. This criterion must be considered in terms of time and space. The physical location is no longer a barrier to access information through the use of remote access and networks and therefore can be accessed at any time (Goddard, 1991). These remote networks and computer and information technologies provide the infrastructure which enables information to be distributed. Seeing that this criterion is dependant upon the technological criteria, the author is of the opinion that it should rather be addressed together with the technological criterion rather than on its own. Remote networks provide the infrastructure which enables information to be distributed and stimulates the interaction and exchange of data, information and knowledge between the community's local knowledge system and the global knowledge system. If an adequate technological infrastructure is lacking, then the country or community will not be able to access information through use of these networks, and the interaction and exchange of data, information and knowledge will not be possible.

According to Martin (1995), the force that enables the flow of information to offices, factories, schools, and educational facilities and to homes will be the technological infrastructure. It would not be possible for global markets to function effectively without the power of computers and telecommunication systems (Martin, 1995). Britz *et al* (2006) states that the technological criterion (ICTs and connectivity) is also one of the four criteria identified as pillars of a knowledge society. Participation in the information and knowledge society is based upon connectivity to modern information and communication technology. Unfortunately, developing countries and communities do not have an adequate technological infrastructure, resulting in a digital divide. This divide is a huge barrier for developing countries and communities to

overcome if they want to progress towards the information and knowledge society and will be discussed later in this thesis.

Van Adenhove *et al* (1999) are of the opinion that this technological infrastructure refers to the implementation of, amongst others, integrated broadband networks, which will remove the barriers of time and space. Unfortunately, within a developmental context, these networks are not yet in place. In addition to the physical network infrastructure, a very important part of this infrastructure of the information and knowledge society are the computer components, namely hardware, software and peripheral ICT equipment. It could be deceiving to look only at the network infrastructure when talking about the spatial & technological criteria of the information and knowledge society (Van Audenhove *et al*, 1999). Except for the physical infrastructure comprising of cables, routers, etc, the availability of personal computers, servers, and internet hosts also form part of this technological criterion.

From the perspective of this thesis, the number of internet users in the country, is very important. This number is a very good indication of the amount of people in the country that can use the internet to facilitate the interaction and exchange of data, information and knowledge from the global knowledge system, represented here by the internet, and the community's local knowledge system. Through this interaction and exchange of data, information, and knowledge, the development of the country can be stimulated, through the promotion of human development in areas such as health, education, social services and commerce.

However, can this information and communication technology really facilitate development? Within the international development community, there is a widespread hope that ICT's could be a powerful tool of development and poverty reduction, and of achieving the Millennium Development Goals. Many development organisations, such as the World Bank and USAID have used ICT as a tool for the development of underdeveloped or developing countries. For more than 30 years, USAID has applied information and communication

technology (ICT) to development. Currently, the majority of programs initiated by USAID, have an ICT component. Historically, USAID has used ICT as an instruction method to lower infant mortality rates, control population growth, battle HIV/AIDS, promote sound practices for natural resource management and agricultural production, and support relief and reconstruction efforts with distance education technologies.

Heeks (2002) sees information and communication technology as being at the core of enabling developing countries to become part of the information and knowledge society. As previously discussed, Heeks is of the opinion that education and decision-making contribute directly to development and that this decision-making, is dependant upon information which, in turn, is converted into knowledge. Heeks elaborates on this argument by introducing the concept of information communication technologies that, according to him, can deliver information and knowledge. However, this information and knowledge has no value unless it results in decision-making and actions. As discussed in the following section, decision-making and actions can be applied in a political dimension to ensure the freedom of information leading to more participation in the political process by the people.

It can be seen from the above discussion that within an information and knowledge society, a sophisticated information and communication infrastructure comprising of hardware components (personal computers, servers, internet host etc), software, (operating and application software) physical network infrastructure (cables, routers, hubs etc), and the skill and the ability to use these components, is needed.

3.5.3 Political criterion

For an information and knowledge society to be successful, the society must have the necessary infrastructure and levels of democracy to ensure the information based rights of citizens such as freedom of access to information, freedom of expression and intellectual property rights. This high level of democracy can only be obtained if the country has legislation in place

guaranteeing freedom of expression, freedom of access to information and the freedom to create intellectual property and have the assurance that this property will be protected by intellectual property rights.

This high level of democracy can be identified as one of the indicators of the political criterion. Furthermore, freedom of expression and freedom of information will, in turn, lead to a political process characterized by increased participation and consensus, which can be measured by researching voter turnouts for national elections. As previously mentioned, increased participation within the political processes of a country is one of the three dimensions of criticism Hamelink (1986) has against the information and knowledge society. Much of the focus on the political effects of information-generated change has traditionally been on the possibility and potential benefits of electronic polling and enabling more people to participate in for example a national election (Martin, 1995).

Webster (1999) is very critical of the notion that information communication technologies can save and revive democracy in the information and knowledge society. Webster rejects the suggestion that ICT's are a primary solution to the problem of disillusion with democratic politics because these have the capability of improving the knowledge of the people. His criticism centres around the argument that ICT's cannot, necessarily, bring about information systems that are so improved that they will provide easy and affordable access to relevant information, seeing that these information systems have demonstrably failed to fulfil their potential.

From the perspective of this thesis, the author agrees with this criticism. ICT's and information systems can only provide citizens with potential information or as Takahasi & Vandenbrink (2004) call it, explicit knowledge. Therefore, for developing communities to be more knowledgeable about public affairs, they need a sophisticated technological infrastructure to be able to access digital information from information systems (explicit knowledge) and combine, interact and exchange this information with their local knowledge and experiences (tacit and explicit knowledge) to create contextualised knowledge

(formative knowledge). Explicit knowledge on its own, retrieved from an information system cannot improve the knowledge of the people, and increase their participation in the political process.

Many governments are making an effort to ensure that their people have easier access to government information (explicit knowledge). Through the use, and application, of e-government initiatives, governments are made more citizen-centric by providing citizens with easy access to accurate, consistent, and timely government information. It can, therefore, be see that the interaction and exchange of data, information and knowledge from the global knowledge system, represented here by e-government initiatives on the internet, and the community's local knowledge system is vital for ensuring the freedom of political information that will stimulate more participation in the political process. Initiatives like these will be discussed later in the thesis under the social criterion.

It is, therefore, clear that within an information and knowledge society, high levels of democracy and increased citizen participation in the political process are needed. This can be accomplished though the improved availability and ease of access to political information that can be attained through the application of e-government initiatives. It is further important to note that the political criterion is dependant upon the technological criterion, in the form of a sophisticated information and communication infrastructure consisting of personal computers (and the skill to use them), servers, internet hosts, cables, routers and hubs. This infrastructure needs to be in place before governments can implement initiatives such as e-government programs, which will be discussed later in the thesis.

3.5.4 Social criterion

Martin (1995) is of the opinion that in an information and knowledge society, information is seen as an enhancer of the quality of life. Thus, where an information and knowledge society exists, there is widespread information consciousness and end-user access to high quality information and

education. This notion is supported by Thapisa (1996) who feels that global information should promote human development in areas such as health, education, social services and commercial activity. Webster (1999) indicates that this can be achieved through the use of media such as television, radio, newspapers and the internet which enable the dissemination of high quality information along the information superhighways. The promotion of human development in areas such as health, education, social services and commercial activity, through the interaction and exchange of information from the global knowledge system is represented here by the information superhighways and the local knowledge system of the community. This criterion correlates with Webster's' (2002) occupational criterion and the education facet corresponds with Britz *et al*'s (2006) fourth pillar of the information and knowledge society: human intellectual capability. Britz *et al* (2006) stipulate that intellectual capital is the most valuable asset of the information and knowledge society and must not be ignored in favour of the technological capacity. Van Audenhove (2003:65) supports this argument and states that the main focus in the development effort has, in recent years, shifted towards the "technological, to the detriment of the educational." Van Audenhove firmly believes that education opens opportunities to individuals. Ferguson (2006) feels that economic achievement and educational achievement are intertwined. For that reason, education is at the heart of efforts to promote equal opportunities for all people.

Currently, there are many campaigns aimed at promoting the importance of completing secondary education. Many governments have created laws to insure that scholars must attend school until they are of a certain age. This is called compulsory education and is one of the criteria needed for a country to become an information and knowledge society.

The social criterion can also overlap with many of the other criteria and could embrace just about anything to do with information-led social change. For example, it could include the impact of Freedom of Information legislation on society (Martin, 1995) as well as the social impact of ICT; for instance, the internet on communities (Kling, 1999). One initiative that has shown great

progress in the dissemination and access to high quality information is e-health. The goals of e-health include ways for improving health care systems, improving patient safety, improving the interoperability of health information systems, and improving the capability for exchanging patient information while increasing the effectiveness and containing costs. Through initiatives like this, as well as e-learning and e-government initiatives, the power of ICT is harnessed in society to improve public services in these sectors.

A further aspect of the social criterion is content that is usable and affordable. As already mentioned, access to information alone is not enough, and being connected, even with the best ICT infrastructure, does not necessarily mean that people are informed. The information should be affordable, available, timely, relevant, readily assimilated and in a language the user can understand (Britz *et al*, 2006). As previously discussed, Heeks (2002) agrees with this statement and elaborates further by saying that ICT's can deliver information and knowledge. However, this information and knowledge is not usable unless it results in decision-making and action, thus it has to be relevant and timely. Affordability of information is another big problem in delivering usable content and relates to the economic criterion for an information and knowledge society, which has already been discussed. One way of measuring affordability of information available in the global knowledge system is through the pricing of the internet connection used to access this information.

Clearly, information should be seen as an enhancer of the quality of life within an information and knowledge society. This can be achieved by the development of human intellectual capital in areas such as health, education, social services and commercial activity, through the dissemination of high quality information along the information superhighways. Hence, compulsory education, e-health, e-learning and e-government initiatives and access to affordable, easily understandable information are integral components of the social criterion, and can be seen as specific indicators to which a country has to comply with, in order to become an information and knowledge society.

3.5.5 Cultural criterion

Of all the criteria mentioned above, those which entail changes in cultural values and morals are the most difficult to identify. According to Nassimbeni (1998), the information and knowledge society will serve the cultural enrichment of all citizens through diversity of content, reflecting linguistics and cultural diversity. Thus, the information and knowledge society will provide content of a diverse nature to cater for all cultures. Martin (1995) elaborates on this perception by adding that the cultural value of information in the information and knowledge society will be recognised through the promotion of information values in the interest of national and individual development. In an information and knowledge society, people respect others' beliefs, values, norms and religions and through information about the particular aspect, a better understanding is created leading to cultural and language diversity. This sentiment was also re-iterated by UNESCO's declaration on preserving cultural diversity (UNESCO, 2001). The declaration was born from a roundtable discussion of the WSIS, which was intended to analyse cultural development issues within the information and knowledge society. Some of the central issues identified were; the promotion of linguistic diversity on global information networks; the production of local and indigenous content on the internet; and universal access to cyberspace. From these central issues indicators of the cultural criterion can be identified.

Furthermore, the preservation of a country's cultural heritage is of the utmost importance within an information and knowledge society. According to Europe's Information Society Thematic Portal (eEurope, 2007): "Digital libraries make cultural resources more easily accessible and open new ways for people to experience their cultural heritage, and digital preservation helps keeping the past and the present for the future." ICT's can play an important role in providing access to such culturally diverse content. Through the use of modern ICT's, a nation's rich cultural heritage can be preserved through initiatives such as digital libraries, which can also be acknowledged as one of the indicators of the cultural criterion. This opinion is supported by the World Summit on the Information Society's (WSIS, 2003), common vision of the

information society. According to this vision, attention must also be given to the special situation of indigenous peoples, not just to the preservation of their heritage and their cultural legacy. From this vision, the author can conclude that initiatives dedicated to indigenous people and their knowledge, thus indigenous knowledge initiatives within the specific country, can be identified as another indicator of the cultural criterion.

Seen from an economic perspective, the cultural diversity and heritage of a country can be utilised to increase the international exposure of the country. Advertising and marketing these cultural treasures can increase tourism to the specific country. Increased tourism, in its turn, will lead to an improvement of the country's economic profile in terms of creating more job opportunities and reducing poverty. These economic aspects will be discussed in greater detail as indicators of the economic criterion.

It is the author's opinion that the respect for other people's beliefs, values, norms and religions, leading to greater cultural diversity can be enhanced through the interaction and exchange of data, information and knowledge from the community's local knowledge system and the global knowledge system. Through this exchange process, data, information and knowledge of a specific community's beliefs, values, norms and religions can be made available on the global knowledge system where other communities can access it. In this way, communities can access information regarding other people's beliefs, values, norms and religions and these aspects will thus become more familiar to them, stimulating mutual respect and understanding.

Thus, it can be seen that within an information and knowledge society, the indicators of the cultural criterion are many and varied. They include: universal access to cultural content; digital libraries that can preserve cultural diversity; initiatives that protect the indigenous people of the country, their culture and their knowledge and tourism that promotes and markets a specific countries cultural heritage. These indicators are needed for a country to become an information and knowledge society. This can be stimulated through initiatives

and programs such as e-culture and indigenous knowledge programs. These indicators will be discussed in greater detail in the following chapter.

3.5.6 Physical infrastructure criterion

According to Britz *et al* (2006) many policy makers forget that the information and knowledge society is still underpinned by a reliable, and highly sophisticated physical infrastructure comprising of items like airports, railways, trucks, roads, and warehouses. As with the social criterion, this infrastructure and its deliverability are often overlooked and underemphasized: without a reliable infrastructure the dematerialised economy of the information and knowledge society would be of little use. For example, information regarding a cure for a deadly disease would be of little use to a developing community where there are no roads by which the particular vaccine could be delivered. This information would also be of no use if it were not accessible, affordable, easy to understand and if it were irrelevant to their need. This relates to the second pillar of the information and knowledge society, namely usable content, discussed by Britz *et al* (2006) and has already been discussed in Section 3.5.4.

It can be seen from the above discussion that within an information and knowledge society, a physical infrastructure is needed. Accessible airports, roads, railways, harbours, as well as modes of transport are needed, that can utilise this infrastructure and be used for transportation. It is further important to note that the physical infrastructure criterion does not have a direct impact on the interaction and exchange of data, information and knowledge from the countries local knowledge system with data, information and knowledge in the global knowledge system. The author is however of the opinion that this criterion is still important as it has a direct impact on some of the other criteria of an information and knowledge society, that in turn has an bearing on the interaction and exchange process. For example, the physical infrastructure can influence the economic criteria of the information and knowledge society as the import and export of goods that are reliant upon this physical infrastructure, will have some bearing on the GDP of the country as well as

the quality of life in the country. As previously discussed these indicators have a direct influence upon the interaction and exchange process. Thus in this way the physical infrastructure criterion indirectly still influence this process and therefore needs to be addressed.

3.5.7 Knowledge criterion

From the perspective of this thesis, the author would like to add one more criterion required by developing countries and communities to become an information and knowledge society – knowledge interaction and exchange. As already discussed in the previous chapter, the relationship between information and development is a crucial one. All societies, including developing countries and communities, need information to develop, specifically local information. Mncube (2003) supports this view and states that it is axiomatic that information be recognised as an essential resource for social and economic development. According to Mncube (2003:6), the failure to recognise this vital role of information within the development arena has egregious consequences for development. Developing communities are not in a position to exploit information, in other words to create, locate, use, and distribute global information to transform it into usable content. For making use of existing global knowledge, local communities need sophisticated skills that enable them to analyse, translate and synthesize global knowledge and then to blend it with local knowledge in order to create new forms of local content (IKWW, 2002). Thus, local content and/or local e-content is one of the indicators of the knowledge criterion. As discussed in the previous chapter, developing communities need to be able to access digital information from the internet (explicit knowledge) and combine this with their local knowledge and experiences (mostly tacit knowledge) to create contextualised knowledge (formative knowledge).

Information and knowledge interaction and exchange needs to take place for developing countries and communities: to share in information that will stimulate mutual respect and understanding; to access information that can be used as a key to economic wealth and prosperity; to increase information

related activities; and to increase human intellectual capabilities. That is, to benefit from becoming an information and knowledge society.

The question remains: To what extent will the developing communities benefit from becoming part of the information and knowledge society? In other words: what are the pros and cons of the information and knowledge society? These questions will be addressed in the following section.

3.5 PROS AND CONS OF THE MODERN INFORMATION AND KNOWLEDGE SOCIETY

There are so many apparent advantages for developing countries and communities to become information and knowledge societies. These include the acceleration of their development plans, economic growth stimulation, and new opportunities in education, trade, healthcare and job creation (ECA, 1996). These advantages are so readily apparent that no real thought is put into the negative aspects or disadvantages that could result from inclusion within the information and knowledge society.

Negroponte (1998) correctly argues as follows: “In the comfort of being digital, we forget the enormous leverage a single connection provides to, say a rural primary school in one of the hundred poorest nations. In these places, there are no libraries and almost no books - the schoolhouse is sometimes a tree. To suddenly have access to the world’s libraries – even at 4 800 bits per second – is a change of such magnitude that there is no way to understand it from the privileged position of the developed world.” This summarises the position of many people who are so “comfortable” being digital that they are blind to some of the disadvantages and dangers associated with the information and knowledge society. In the following section the author will address the pro’s as well as cons for the developing world in their efforts to become part of the global information and knowledge society.

3.6.1 Possible advantages of becoming an information and knowledge society

Based on the identified criteria of an information and knowledge society, it is possible to identify a number of advantages countries can benefit from in becoming such a society. These benefits include:

- Becoming partners in global digital world trade;
- Access to affordable scientific knowledge and other forms of information needed for development;
- Becoming exporters of local knowledge via ICT;
- Job creation;
- Leapfrogging into new information communication technologies, and gaining the benefits thereof;
- Bringing information closer to the resource;
- Providing better and more co-ordinated relevant services such as education, health care and similar services.

These benefits will be explained in greater detail in the following section.

3.6.1.1 Becoming partners in global digital world trade.

With the use of modern information and communication technologies, communities can become partners in global digital world trade. According to the World Trade Organisation, developing countries are becoming more important in the global economy, and they increasingly look to trade as a vital tool in their development efforts. Developing countries can, through the use of information communication technologies, access trade opportunities in other countries, and thus improve their economic situation.

According to the Director-General of the WTO, Supachai Panitchpakdi, (Panitchpakdi, 2005) trade plays a growing role in economic activities of developing countries, and is increasingly important for development and poverty alleviation. It is through trade that countries can chart a path towards

sustainable development and a higher standard of living in the information and knowledge society. According to the United Nations Conference on Trade and Development's (UNCTAD, 2002) report the integration into world trade by developing countries is essential although it is not in itself sufficient for ensuring the country's development. The Report questions the conventional wisdom that export growth and foreign direct investment (FDI) automatically generate commensurate income gains. The report asks the question: "Why is it that developing countries are trading more, but earning relatively less?" According to UNCTAD, the answer lies in the fact that they are competing among themselves to export similar labour-intensive manufacturing products to the same markets. The report further suggests that countries should move into higher-value exports by upgrading technology and improving productivity.

It can be seen from the above discussion that becoming global digital trade partners, is reliant, amongst others, upon the technological infrastructure of the country, and this relates to the spatial & technological criteria of becoming an information and knowledge society. Through this global digital trade, the economic situation of the country can also be improved, thus relating to the economic criterion of the becoming an information and knowledge society.

3.6.1.2 Access to affordable scientific knowledge and other forms of information needed for development

Affordability is a very important and limiting factor for developing countries and communities. Over the past few years apprehension over the growing information gap between developed and less developed countries has resulted in a magnitude of initiatives from professional societies and publishers, designed to supply journals to the developing world. These initiatives have largely focussed on the provision of electronic information, as this can be provided to developing countries at little cost to the information provider. According to Britz *et al* (2006), these initiatives and programmes have been launched to make access to content affordable to African institutions, for example, HINARI (Health InterNetwork Access to Research

Initiative), AGORA (Access to Global Online Research in Agriculture) and PERI (Programme for the Enhancement of Research Information).

HINARI is an initiative of the World Health Organisation and provides free or very low cost online access to the major journals in biomedical and related social sciences for WHO-approved academic institutions in the developing world. HINARI was launched in January 2002 with more than 1200 journals. Since then, the number of participating publishers, journals and other full-text resources has grown continuously and now includes over 2700 biomedical and related social science journals.

Another very successful initiative is AGORA of the United Nations Food and Agriculture Organization (UNFAO). AGORA is an initiative to provide free or low-cost access to major scientific journals in agriculture and related biological, environmental and social sciences to public institutions in developing countries. The goal of AGORA is to increase the quality and effectiveness of agricultural research, education and training in low-income countries and, in turn, to improve food security. Currently, AGORA provides access to over 700 journals from the world's leading academic publishers to UNFAO-approved institutions in the developing world (http://www.annualreviews.org/about/philanthropy.aspx).

According to the International Network for the Availability of Scientific Publications (INASP), PERI was created to support capacity building in the research sector in developing and transitional countries through strengthening the production and dissemination of, and access to, information and knowledge utilising new information and communication technologies (ICTs). Affordability further relates to the social criterion of becoming an information and knowledge society. Through affordable access to scientific information, the quality of life in developing countries can be enhanced and, as previously discussed, this forms an integral component of the social criterion to which a country must comply with in order to become an information and knowledge society.

3.6.1.3 Becoming exporters of local knowledge via ICT

With the use of the advanced technological infrastructure that is a criterion for the information and knowledge society, communities will be able to become exporters of their own local knowledge. As already discussed, this local knowledge is knowledge and/or skills that are specific to people or communities in a particular area and that is contextualised within this area. This knowledge would include agricultural knowledge, knowledge of local flora and fauna, local history of the earth and weather systems, knowledge concerning local languages and dialects, local knowledge of social interaction, conflict resolution, knowledge on child rearing, and old age care (Panyarachun, 2001). Developing countries and communities can, through the use of modern ICT's, export this knowledge to the global knowledge system. This further relates to the knowledge criterion of the information and knowledge society. For communities to become exporters of local knowledge, knowledge interaction and exchange needs to take place.

As previously mentioned, this can be achieved by developing communities accessing digital information from the internet (explicit knowledge) and combining this with their local knowledge and experiences (mostly tacit knowledge) to create contextualised knowledge (formative knowledge). This will further result in the stimulation of mutual respect and understanding which also relates to the cultural criterion of the information and knowledge society.

3.6.1.4 Job creation

Within the information and knowledge society, the level of skill required for work is different than in the industrial society (Toffler, 1980). As previously mentioned, Toffler is of the opinion that the low skilled, interchangeable muscle work of the industrial era will be replaced by high skilled, non interchangeable 'brain' work, in the information era. According to Lor & Britz (2007), skilled people are a precondition for progress towards an information and knowledge society. Especially in the ICT arena, more jobs requiring skilled brainwork will be created within the information and knowledge society.

Reding (2005) states that information and communication technologies play a crucial role in growth and job creation within the information and knowledge society. ICTs add value to goods and services, make business and government processes more efficient, and deliver the services that citizens and businesses need. The latest statistics show that the ICT sector represents over 5% of the European Union GDP. This 5% drives 25% of overall growth and about 40% of our increase in productivity (Reding, 2005). The European Commission is of the opinion that the information and knowledge society opens new perspectives for the quality of work - creating the conditions for change in existing jobs, generating new working methods and new ways of organising work, and allowing greater flexibility in the workplace. This has led to the rise of telework and eWork. According to the Europe Information Society Thematic Portal (eEurope, 2007), eWork can generally be defined as any normal business activity carried out from a remote location by using modern computing and communication technology.

Thus within the information and knowledge society, with the support of an advanced technological infrastructure, (which relates to the spatial & technological criteria of the information and knowledge society), the dynamics of work will change. Work will be able to be performed from remote locations, thus abolishing time and spatial limitations. The technological infrastructure of the information and knowledge society will support new wireless and display technologies that will change office equipment and design, and the nature of work itself (which relates directly to the cultural criterion of the information and knowledge society). Within the information and knowledge society using creativity and innovation to create change will became more important than simple productivity in routine tasks, resulting in greater participation in work Work will be not only more accessible, but more attractive.

3.6.1.5 Leapfrogging into new information communication technologies and the benefits thereof

According to Wikipedia (Wikipedia, 2007a), leapfrogging is a theory of development in which developing countries skip inferior, less efficient, more

expensive or more polluting technologies and industries and move directly to more advanced ones. The main aim is to promote greater access to computer and other technologies, for those people who would normally have no way of accessing it on their own. According to the European Union, developing communities will, within the information and knowledge society, have the possibility to leapfrog past several interim stages of technological development to become leading-edge players. However, this will be dependent upon the right combination of technology and forward-looking government policy, thus relating to the technological and political criteria of the information and knowledge society. Leapfrogging will further help developing countries overcome the digital divide. This aspect will be discussed in greater detail later in the thesis.

According to Davison *et al* (2000) leapfrogging has been used with great success to help countries develop a technological infrastructure for internet access. For example, rural parts of Papua New Guinea have seen their telecommunications infrastructure move from nothing to a satellite based system in a single leap, providing them with internet access and connectivity. Similarly, cellular telecommunications have been introduced to many developing countries to replace much older (or non-existant) landlines.

Thus, telecommunication leapfrogging is a way of diffusing information technology, acting as a catalyst that can boost growth rates and improve competitiveness within the information and knowledge society. However, a very important fact to consider is that technological leapfrogging can only be successful if the country or community has the required application of implied knowledge and skills with regard to the technology. In addition to purely technological issues, the development of appropriate human resources skills is required, for example extensive training of the people who are going to use (and train others to use) the technology, thus relating to the education and skills component of the social criterion of the information and knowledge society.

3.6.1.6 Bringing information closer to the resource

A further advantage the information and knowledge society can result in is bringing information closer to the resource. For example, there are a variety of information intermediaries for farmers and rural communities in developing countries. These include extension agents, traders, input suppliers, and other farmers. Using modern information and communication technologies, information regarding resources for the community can be made available electronically to all these information intermediaries. The farmer can now make the price of vegetables available on the internet, giving the traders access to the information. As a living example of a success story that shows how bringing the information closer to the resource can benefit communities within the information and knowledge society, observation can be made of farmers in Santa Cruz, Bolivia.

According to the Global Knowledge Partnership's *ICT Success Stories in Development* (Global Knowledge Partnership, 2003), simple communication (by radio) of information sourced from the internet and passed on through email, has helped improve the lives of 14,500 families, who produce 70 per cent of the vegetables consumed in the city of Santa Cruz, Bolivia. As the farmers rarely ventured from their villages, they depended upon middlemen, brokers, and other information intermediaries, who collect the products directly from the farms. These intermediaries would take the vegetables to the markets in Santa Cruz to sell the products in the markets. Following that, they would return to the farms and the information intermediaries would then pay the producers whatever price suited them. As the farmers were not aware of the market prices of their produce, they had no negotiating power, and accepted whatever they were given. For the most part, farmers were not even able to cover the costs of production. Since the creation of a radio programme called *El Correo del Agricultor* under the auspices of Instituto de Capacitación del Oriente (ICO), all of that has changed. In Bolivia, radio is an important form of mass media in rural communities. *El Correo del Agricultor* has helped change things around for farmers in the region by offering them information, such as the price list for the main agricultural products for that

day. This radio programme has brought the information closer to the resource, giving the farmers and producers of goods the negotiating power they needed.

It can be seen from this discussion that this advantage of the information and knowledge society relates directly to the spatial & technological criteria as well as the economic criterion of the information and knowledge society.

3.6.1.7 Providing better and more co-ordinated relevant services such as education and health care.

Education and the investment in human capacity is one of the key success factors in the information and knowledge society and will facilitate development and economic growth (Britz *et al*; 2006). The achievement of universal elementary education is also addressed by the Millennium Declaration (United Nations, 2000). According to the Spanish Ministry of Science and Technology (2003), modern ICT's can be utilised for the training of more teachers through distance training, e-learning and knowledge networks where teachers can unite with one another. Quality teaching material and resources can be made available through ICT and education and literacy programmes can be initiated. This benefit or goal that the information and knowledge society can offer, is also dependant upon the development of the country's or community's efficient ICT infrastructure.

According to Thapisa (1996), the alleviation of dependence, hunger, illiteracy, disease and economic deprivation can be achieved through the investment in the information and communication infrastructure of the information and knowledge society. This goal is further supported by the Millennium Declaration (United Nations, 2000). Through the use of modern ICT's the information and knowledge society will offer developing countries and communities participation in the world economy and to benefit from its comparative advantages. Health services can be improved by better basic training of health workers through the use of distance training, and public access to basic health information can be enhanced by facilitating the

development of content, tailored to local circumstances and in national languages (Spanish Ministry of Science and Technology, 2003).

This benefit was also supported by the G8 leaders, although it was highly contested. Anti-poverty advocates burned a laptop on a beach near the G8 Conference summit venue in Japan, in protest against the view that ICT's can help reduce poverty. An angry protester exclaimed: "If they are hungry, the poorest people in the world can't eat laptops. An internet connection won't help them survive malaria or TB (Tuberculosis)" (Tapscott, 2000).

The author disagrees with this view, seeing that it might not be the internet connection that would save them, but the access to information obtained via the internet connection. With access to relevant information, people suffering from illnesses, such as malaria or TB, could be assisted to cope better with their illness, could locate possible treatments as well as understanding what causes such illness (and so prevent future infections).

The author has only named a few of the benefits the information and knowledge society can offer. The list of benefits is long, seeing that information is the key factor of the information and knowledge society and is a critical part of every aspect of life, as aptly described by Brown & Duquid (Brown & Duquid, 2000). However, there are not just benefits and advantages involved in becoming an information and knowledge society. This society can bring many dangers and disadvantages to continents as well. These disadvantages will be addressed in the following section.

3.6.2 The disadvantages of becoming part of the global information and knowledge society

3.6.2.1 Information Overload

Theobald (1996) cites the first and most obvious danger of the information and knowledge society as the increase in the amount of information a person has to process on a daily basis, due the modern information and

communication technologies. Although sometimes seen as a benefit, this is becoming a profound problem because when information doubles, knowledge halves and wisdom quarters (Theobald, 1996). This is, perhaps, best described by Brown & Duquid (2000): the New York Times, on a normal weekday, contains more information than any person living in the Shakespearean time would acquire in their whole life time. Where once there was too little information to swim in, now it's hard to stay afloat. The so-called third wave or Information Age has become a Tsunami (Brown & Duquid, 2000).

According to Brown & Duquid (2000), this danger of the information and knowledge society has come about due to users' wrong impression concerning information. To prove their argument, they use the comparison used by Negroponte in his book, *Being digital*, namely comparing atoms, the fundamental unit of matter, with bits - the fundamental unit of information. They argue that during the industrial age, the information age's role model, people learned how to manipulate atoms in unprecedented fashions. Yet people did not complain that they were drowning in atoms, because they perceived atoms as beds, tables, chairs, and other tangible assets. Thus, people would not complain of drowning in information, if they perceived information as stories, documents, diagrams and pictures. This perception however, is being challenged by information technology, which, information enthusiasts insist, will see the end of documents, break narratives into hypertext and reduce knowledge into data (Brown & Duquid, 2000).

This information overload has an affect on decision-making. Where, in the past, it was felt that information can assist in decision-making (Machlup, 1983) and that information can reduce uncertainty (Lancaster, 1987), the overload of information has resulted in exactly the opposite. With the floods of information available via modern information communication technologies, it is sometimes more and more difficult to make a correct decision. Placed within a development context, information overload and the inability to access or understand the information one needs for decision-making, escalates the uncertainty of the users, resulting in information anxiety (Gorman & Dorner,

2006). This information anxiety can lead to problems pertaining to knowledge sharing and exchange, which is one of the criteria of the information and knowledge society. If users in developing countries and communities are suddenly confronted with large amounts of information, causing information anxiety, these users will be less eager to take part in the interaction and exchange process of data, information and knowledge between their local knowledge system and the global knowledge system. As already discussed, this interaction and exchange process is necessary for developing countries and communities to share in information that will stimulate mutual respect and understanding, to access information that can be used as a key to economic wealth and prosperity, to increase information related activities, and to increase human intellectual capabilities.

From this discussion it can be deduced that this disadvantage of the information and knowledge society directly relates to the technological criterion that is the cause of the information overload, and the knowledge criterion, in which the user will be less eager to participate due to the information anxiety caused by the information overload.

3.6.2.2 Organisation and observation

According to Anthony Giddens (1991) the world in which we live is much more organised than ever before. Our daily lives are planned and arranged by institutions in unprecedented ways. Giddens, however, does not see this as being a disadvantage and argues that our increased liberties are very often closely related with greater organisation and that it does not mean that nowadays we inhabit some sort of prison (Giddens, 1991). Webster (1995), however, is critical of this organisation of our lives and argues that one consequence is easily overlooked, namely, that to organise life, information must be gathered on people and their activities. As previously discussed, in the information and knowledge society, organisation and observation cannot be separated. Organisation and observation are like siamese twins which have grown together with the development of the modern world (Webster, 1995).

Banisar (1996) makes it clear that collecting information about people has been an ongoing practice since the beginning of civilization. Many early cultures, for example, the ancient Babylonians, the Greeks, the Chinese and Romans – kept extensive files on their citizens created through surveillance. In 1928 a US Supreme Court Justice, Louis Brandeis, was of the opinion that: "Subtler and more far-reaching means of invading privacy have become available to the government. Discovery and invention have made it possible for the government, by means far more effective than stretching upon the rack, to obtain disclosure in court of what is whispered in the closet," (Trope, 2007).

Today, Justice Louis Brandeis would be appalled at how far surveillance technologies have evolved. Up to the 1960's, surveillance was a very tedious job requiring many man-hours. For example, the East German secret police employed 500,000 secret informers, 10,000 of whom were employed just to eavesdrop on and transcribe its citizens' conversations. In the information and knowledge society ICT's have evolved so far they are able to centrally store and process large amounts of information - revolutionizing surveillance. According to Banisar (1996), in the information and knowledge society, information on almost every person in the developed world is held on several hundred databases, and then collected, analysed, and disseminated by governments and corporations. This has resulted in power relationships. According to Foucault (1992), disciplinary power is regulated through surveillance and penalty. Foucault (1992) is of the opinion that, "Traditionally, power was what was seen, what was shown and what was manifested, and paradoxically, found the principle of its force in the movement by which it deployed that force. Those on whom it was exercised could remain in the shade; they received light only from that portion of power that was conceded to them, or from the reflection of it that for a moment they carried. Disciplinary power, on the other hand, is exercised through its invisibility; at the same time it imposes on those whom it subjects a principle of compulsory visibility . . . the examination is the technique by which power, instead of emitting the signs of its potency, instead of imposing its mark on the subjects, holds them in a

mechanism of objectification," (1992:187). This compulsory visibility is achieved within the information and knowledge society through the use of surveillance and observations.

It is with this propensity towards surveillance that the danger comes in. Webster's (1995) primary concern is a double-related issue. The first is that agencies, for example government agencies, can access files that were collected for other purposes and secondly, new information technology makes it possible to weld together information databases. With new IT developments, it is now possible to make connections, draw conclusions, and construe an individual profile of considerable complexity of an individual (Webster, 1995).

From such surveillance, one may be drawn to the metaphor of Foucault's (1979) panopticon. The panopticon refers to Jeremy Bentham's architectural design of prisons, hospitals and asylums, whereby custodians could observe patients and prisoners the whole time. According to Foucault this can be seen as a metaphor of modern life, where a panopticon can be constructed without physical walls. Nowadays, due to advances in IT, people can be observed without knowing who is doing the observation.

James Walker (2000) of ABC news stipulates that software technology has been developed that can retrieve every piece of information on a computer: e-mail, memos, personal financial data and electronic images. This program, called Spector, runs quietly in the background, taking snapshots every few seconds of the computer screen, then stores them for later observation and inspection. Enter the password, and all the information, incriminating or not, pops up on the screen. The person you are spying on never knows. This is only one of many such programs, designed to observe and control. In the United States, a political storm has arisen over a FBI internet tapping system codenamed Carnivore, and looming over all surveillance programs is Echelon -- a global satellite web whose Canadian centre is located at the Canadian Forces Station, Leitrim. This program is able to monitor phone calls, faxes and internet communications by zeroing in on key words. This electronic

snooping has a wide variety of uses, from monitoring employees to police investigation to marketing (Landon, 2000).

However, the use of this type of technology does raise the question of "Big Brother" watching you, and leads to ethical questions regarding the individual's right to privacy for example: Who is doing the watching? Who is watching the watchers? What is being done with the gathered information? Who has access to this information? The list goes on.

It can be deduced, from this discussion, that observation and organisation as a disadvantage of the information and knowledge society, relates to the technological criterion (technology is needed for the observation and organisation) and the cultural criterion (through observation and organisation a culture of surveillance is created) of the information and knowledge society.

In the next section, the author will address the biggest and most published socio-economic threat of the information and knowledge society, namely the digital divide.

3.6.2.3 The Digital Divide

According to Lor (2003), a great deal is being said and written about the 'digital divide.' Conferences and seminars are held on this topic and even websites have been set up to deal with discussions concerning the 'digital divide' (e.g. Bridges, 2002, Digital Divide network, 2002, Digital opportunity channel, 2003, DigitalDivide.org, 2003). To show the reader the magnitude of this phenomenon, as a disadvantage of the information and knowledge society, the author will capture selected authors' statements on this phenomenon. This phenomenon will be addressed in greater detail in a following chapter of this thesis.

The term, "digital divide" was first coined in the 1990's by Larry Irving, Assistant Secretary for Communications and Information Administrator at the National Telecommunications and Information Administration (NTIA), U.S.

Department of Commerce. Irving used this term in a series of reports for the NTIA entitled *Falling Through the Net* that focused attention on "the existing gap in access to information services between those who can afford to purchase the computer hardware and software necessary to participate in the global information network, and low-income families and communities that cannot," (Dragulanescu, 2002, Fienberg, 2002).

Thapisa (1996) describes the digital divide in terms of "discarded people" that are the outcome of the "new order" - this new order being the emergence of the information and knowledge society. Timberlake (1988) sees Africa as a continent on the brink: "while the rest of the world is moving forward...Africa is moving backward." Due to Africa's lack of an efficient ICT infrastructure, Africa is not progressing with speed towards the information and knowledge society. Africa's ICT infrastructure will be discussed later in this thesis.

Shibanda & Musisi-Edebe (2000) are of the opinion that if African countries fail to embrace this wave of world wide digital technology, they may be sunk by it. A European Union document also comments on the unequal rate of introduction and application of ICT in the information and knowledge society: "Advanced countries are rapidly pursuing their vision of the information society agenda and developing countries must do so as well or risk exclusion from global economy and severe disadvantage," (Bangermann, 1994).

This feeling was also expressed in the WSIS Geneva Declaration of Principles (WSIS, 2003): "We are also fully aware that the benefits of the information technology revolution are today unevenly distributed between the developed and developing countries and within societies. We are fully committed to turning this digital divide into a digital opportunity for all, particularly for those who risk being left behind and being further marginalized."

This phenomenon has become so important that governments have started taking note and presidents have started making declarations regarding the information and knowledge society and the possibility of being left behind. The President of Mali, Alhpha Oumar Kanare has made it clear that if Africans

do not join the debate on development, they will be overwhelmed by the evolution of this technology and will be increasingly marginalized (Boldt, 1997).

The former South African President, Nelson Mandela, made the following declaration in a speech to Telecom' 95: "This is a special moment in the world's potential for transition to a truly democratic Information Age...if we cannot ensure that this global revolution creates a worldwide information society in which everyone has a stake and can play a part, then it will not have been a revolution at all," (Klee, 1997).

The current South African President, Thabo Mbeki, is also very concerned about the growing digital divide. In the Millenium African Plan (2001), President Mbeki made the following statement: "The MAP would also need to focus on bridging the digital divide to ensure the continent is not condemned to further marginalisation," (http://www.anc.org.za/ancdocs/pr/2001/pr0202.html). The Millennium African Plan declared a firm commitment by African leaders to take ownership and responsibility for the sustainable economic development and recovery of the continent.

This sentiment is also echoed in the Millennium Declaration (United Nations, 2000). This declaration lists the following 8 principal development objectives:

1. Eradicate hunger and extreme poverty.
2. Achieve universal elementary education.
3. Promote the equality of genders and strengthen the role of women.
4. Reduce indices of infant mortality.
5. Reduce indices of maternal mortality.
6. Fight against HIV/AIDS, malaria and other illnesses.
7. Guarantee a sustainable environment.
8. Foment a world association for development.

According to the Spanish Ministry of Science and Technology (2003), in a publication that would serve to reinforce the Spanish contribution to the World Summit on Information Society, the above mentioned millennium goals cannot

be achieved without the use of ICT's. ICT's form the pillars of the information and knowledge society and play a primary role in the achievement of the millennium objectives. Thus if developing countries and communities fail to bridge the digital divide, then they will not be able to benefit from the millennium development goals.

Many authors and governments have started looking at possible solutions to bridge this gap, but only time will tell if they have any chance of success. The digital divide, and the impact that is has on developing countries, will be discussed in greater detail in chapter 5 of this thesis.

In summary, the advantages and disadvantages associated with becoming an information and knowledge society, can directly be linked to the criteria of the information and knowledge society. This can be seen in Table 3.2 and Table 3.3, below:

Table 3.2: Advantages of becoming an information and knowledge society with their associated criteria

ADVANTAGE	**CRITERIA**
Becoming partners in global digital world trade	Economic criterion Spatial & technological criteria
Access to affordable scientific knowledge and other forms of information needed for development	Social criterion Spatial & technological criteria
Becoming exporters of local knowledge via ICT	Spatial & technological criteria Knowledge criterion Cultural criterion
Job creation	Economic criterion Cultural criterion

Leapfrogging into new information communication technologies and its benefits	Spatial & technological criteria Social criterion
Bringing information closer to the resource	Economic criterion Spatial & technological criteria
Providing better and more co-ordinated relevant services such as education, health care, etc	Social criterion Spatial & technological criteria Political criterion

Table 3.3: Disadvantages of becoming an information and knowledge society with their associated criteria

DISADVANTAGE	**CRITERIA**
Information overload	Spatial & technological criteria Knowledge criterion
Organisation and observation	Cultural criterion Spatial & technological criteria
Digital divide	Spatial & Technological criteria Economic criterion

In the following section, the author will discuss the impact that greater access to information and the global flow of information (due to the interaction and exchange of data, information and knowledge from a community's local knowledge system and the global knowledge system), has on various areas in society. This is relevant in the context of this thesis, as this interaction and exchange process will ultimately stimulate developing countries and communities to become information and knowledge societies. Once they have become an information and knowledge society, the communities and countries will see the impact of this type of society in the areas of: manufacturing, business and finance, education and training, medicine and health. These areas will be discussed in the following section.

3.7 THE IMPACT OF THE GLOBAL FLOW OF INFORMATION ON VARIOUS ASPECTS OF SOCIETY

According to Chisenga (2000), the information and knowledge society, and the resulting global flow of information countries and communities can access via ICT's, holds great promise for humankind. It will have a great impact on many areas of human endeavour, for example, the manufacturing industries, business and finance, education and training and health and medicine. The impact of becoming an information and knowledge society can be seen in the following areas that will now be discussed in greater detail.

3.7.1 Manufacturing industry

According to the Information Economy Report (2006), global economic processes can be stimulated through the creation, dissemination, accumulation and application of information and knowledge. This can be seen in the manufacturing industry and has become such an important aspect that the Massachusetts Institute of Technology (2006) dedicated a conference to the impact that the information and knowledge society has upon the manufacturing industry. Areas that were addressed included outsourcing, supply chains and new methods of distributed manufacturing. Outsourcing often entails the movement of production units to developing countries, due to the improvement in developing countries' ICT infrastructure and reduced labour costs. Supply chains have also dramatically increased, due to more efficient ICT infrastructure. Manufacturing companies can now source products and supplies from all around the world. Traditional boundaries have been removed and structures have been flattened. The flattening of structure in the information and knowledge society has been extensively explored by Thomas Friedman in his book, *The World is Flat*. Friedman (2005) believes the world is flat in the sense that the competitive playing fields between industrial and emerging market countries are leveling. According to Friedman (2005), the world is increasingly connected, and will be changed and flattened through supply chains. In essence, the whole world is a giant supply chain, enabling international companies, for example Dell, UPS and McDonalds, to

function effectively. Outsourcing and supply chains are two of the 10 important world flatteners Friedman discusses.

Chisenga (2000) is of the opinion that the improved information and communications infrastructures which will result from the information and knowledge society, will improve manufacturing through the quick and efficient transfer and flow of information among operations, suppliers, partners, distributors and customers. This will result in better quality products and reductions in production costs. This notion is supported by Toffler & Toffler (1995) who elaborates further by stating that in a third wave economy, "just-in-case" production will be replaced with "just-in-time" production. Just in time (JIT) production refers to producing exactly the amount you require at exactly the time the customer wants it. In other words, in the information and knowledge society there will be an end to the mass production of products and a rise in the customisation of products.

3.7.2 Business and Finance

Chisenga (2000) is of the opinion that the greater access to, and flow of, global information in countries and communities that have become information and knowledge societies, has a great impact on business and finance. Large multinational corporations have been using electronic facilities to conduct some of their business. The transfer of information between businesses has become much faster, cheaper and more reliable and has resulted in the emergence of electronic commerce. The e-business concept goes well beyond e-commerce (buying and selling on-line) as it also encompasses the integration of ICT into business processes of enterprises. According to the MIT Centre of Digital Business (2006), e-business or digital business entails much more than just the intergration of ICT into business process. More specifically, digital business entails digital marketing strategy, digital productivity, information technology products and services, communication futures, the interdependance of security and the extended enterprise. According to the Fifth International Conference on e-commerce, held in Pittsburgh in 2003, the adoption of e-Business practices is continuing to rise

and annual worldwide transaction volumes are poised to pass the trillion-dollar mark. E-Business is definitely here to stay.

Multinational corporations will also become smaller and smaller in the information and knowledge society. Toffler & Toffler (1995) and Van Audenhove *et al* (1999) summarise this phenomenon by saying that in the information and knowledge society, "economies of scale" will be replaced by "economies of speed." Through the use of ICT, small and medium enterprises can potentially have a global reach in the information and knowledge society and can offer, at a very low price, world wide content, services and products (Van Adenhove *et al*, 1999).

3.7.3 Education and Training

Due to the ICT infrastructures of the information and knowledge society, knowledge is changing at an ever-increasing rate. It is being produced and becomes redundant at an ever-increasing tempo (Nassimbeni & De Jager, 2000:193). In his book, *Money Success and You*, John Kehoe (1991), is of the opinion that the average worker in the information and knowledge society will probably have to relearn his job five times in his career. This means that the higher education and tertiary education sector has to prepare students to enter the world of work in such a way that they will be able to adapt to the changes in the work place that the information and knowledge society will require. At a tertiary level, an increasing demand is being experienced to change to more student-centred modes and put the emphasis on preparation for life long learning (Nassimbeni & De Jager, 2000:193).

According to Friedman (2005) the information and knowledge society will produce more highly skilled people by making primary and high school education mandatory. This will further address one of the eight millennium development goals of the Millennium Plan, namely universal elementary education (UNDP, 2003a). Friedman (2005) goes further, stating that a tertiary education will become more and more critical, the flatter the world gets, empowering more people to get a bigger slice of the complex economic

pie. This argument is supported by Lor & Britz (2007) who are of the opinion that skilled people are a pre-condition for progression towards the information and knowledge society, and that the information and knowledge society is characterised by increased spending on research and development by most developed countries.

Unfortunately, there is no increased spending in research and development in many developing countries. Currently the spending on research and development in Africa is less than 0.1% (Science and Development Network, 2003). The situation in Africa with regard to education and research and development, will be discussed in greater detail in chapter 5 of this thesis.

3.7.4 Medicine and Health

At the Seville European Council in 2002, the eEurope 2005 Action Plan was launched, later to be ratified by the Council of Ministers in January 2003. The Action Plan aimed to develop modern public services and a dynamnic environment for eBusiness through the widespread availability of broadband access at competitive prices and a secure information infrastructure (eEurope, 2007).

Lilkanen (2000) lists one of the ten priority areas that the eEurope 2005 Action Plan initiative focuses on, as the maximisation of the use of digital technologies for healthcare. Wallace (1997) is of the opinion that the new technology the information and knowledge society will bring, can be used to provide information about health and illness for different population groups but that it will need to be balanced and will need to compliment conventional methods of providing health information. Conventional methods of information distribution such as leaflets, booklets, and posters must not be abandoned but rather should be used in harmony with the technology of the information and knowledge society, for example CD ROMS, E-mail, and the internet. By utilising this technology, problems pertaining to the distribution of health information to rural areas, for example literacy problems, can be overcome (Kiplang'at, 1999). However, a very serious problem that will have

to be faced is the fact that although the internet and the Web have become a major source of information about health and sickness, the quality of the information varies (Wallace, 1997). It is, therefore, important to only use authoritative and respected websites. To help find such sites, The Help for Help trust has compiled a list of useful Web addresses (http://www.hfht.demon.co.uk). Online services also provide their own source of health-related information (Wallace, 1997).

The information and knowledge society offers new possibilities for improving almost every aspect of healthcare, from making medical systems more powerful and efficient, to providing better access to health information to everyone. In the information and knowledge society, this is referred to as e-health. In 2003, e-health was defined by the e-health Ministerial Declaration, during the e-health Ministerial Conference as follows: "e-health refers to the use of modern information and communication technologies to meet needs of citizens, patients, healthcare professionals, healthcare providers, as well as policy makers." There are many ethical implications that will have to be considered when utilising ICT for health information due to the sensitive nature of the information. These issues of data privacy and public health are some challenges the information and knowledge society will have to overcome if the needs of the citizens, patients, healthcare professionals, healthcare providers and policy makers can be truly fulfilled.

3.8 CONCLUSION

Much has changed since early times when a person who had a working knowledge of Greek or Latin was literate enough to read and use the recorded information. The information explosion brought on by human and technological advances inevitably steered us towards the information and knowledge society. For this reason, this chapter investigated the very nature of an information and knowledge society.

Firstly, the author defined the term information and knowledge society and took a closer look at the evolution of this concept. This society may be

considered to be a myth by some authors and a reality to others. As a reality this information and knowledge society has certain characteristics as well as criteria to which societies must comply with if they would like to become an information and knowledge society. These characteristics and criteria were discussed in detail in the chapter and included economic, technological, political, social, cultural, physical infrastructure, and knowledge criteria.

The author further investigated the potential advantages and disadvantages associated with becoming an information and knowledge society. The advantages of such a society were many and varied. They include becoming partners in global digital world trade; access to affordable scientific knowledge and other forms of information needed for development; along with becoming exporters of local knowledge via ICT. Other advantages include job creation; leapfrogging into new information communication technologies and the benefits thereof; and bringing information closer to the resource and providing better and more co-ordinated relevant services such as education and health care. The disadvantages of becoming an information and knowledge society include information overload, organisation and observation and the digital divide.

The chapter was concluded with a discussion on the impact that greater access to information, due to participation within the information and knowledge society, would have on various aspects of life such as the manufacturing industry, business and finance, education and training and medicine and health.

In the following chapter, the author will discuss globalisation as a concept, as well as the process of globalisation. Attention will be given to the various dimensions of globalisation, as well as the characteristics thereof. An important characteristic of globalisation added by the author is the inclusion of the developed country within the information and knowledge society, due to the constant interaction and exchange of data, information and knowledge between the developed communities/countries local knowledge system and the global knowledge system. The author will investigate by means of a

practical application whether this interaction and exchange is prevalent in developed communities and countries, by discussing whether developed communities and countries can be seen as information and knowledge societies. The author will indicate how the interaction and exchange of data, information and knowledge helps developed communities/countries comply with the specific stated indicators of the criteria of the information and knowledge society, and thus helps developed communities and countries become information and knowledge societies.