

# **MODELLING THE INFORMATION NEEDS OF USERS IN THE ELECTRONIC INFORMATION ENVIRONMENT**

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## DECLARATION

I Gashaw Kebede hereby declare that this thesis is a product of my own work unless where stated otherwise. I also declare that this thesis has not been submitted at any other university for a purpose of a degree.

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## ABSTRACT

To some scholars information needs research has not made satisfactory contributions particularly in informing the development of effective information systems and in helping fully understand the concept of information needs. Although poor methodological choices and lack of theory have been suggested as causes of this problem, this research argued that inadequate conceptualization of information needs is the root cause of the observed unsatisfactory progress in information needs research. Conceptualization is argued as being critical in information needs research because it determines the selection of research focuses and the associated methodologies. Uniformly used appropriate research approaches in turn contribute towards the development of theory in information needs. Conceptualization in this research is understood to mean definitions and/or assumptions held by researchers regarding the essence of the nature of information needs.

Consequently, this research argued that an alternative conceptualization is what is needed to address the unsatisfactory progress in information needs research. To this end, the research proposed to develop a model of information needs and identify related assumptions that would allow the constructing of an alternative conceptualization. Developing a model of information needs is considered as a sound approach because models have the potential to help in specifying what constitute the phenomena they model, identifying research focuses for studying the phenomena they model, and advancing theory in relation to the phenomena they model. The identification of the related assumptions and premises is also necessary to be used in conjunction with the model in order to generate the required conceptualization. The research specifically proposed to develop a model of information needs of users in the electronic information environment as information needs are distinct in each information environment.

Survey of the literature was conducted to identify the elements of the model and the related assumptions and premises. To identify the elements of the model and their

relationships, the research surveyed the literature for factors influencing the content and non-content needs of users in the electronic information environment. In other words the elements of the model selected to represent the information needs of users in electronic information environment are factors that give rise to information needs in the electronic information environment. To identify the related assumptions and premises the research surveyed the literature for supporting evidence on whether information and information needs exist as content and non-content and whether the physical form in which information content is made available influences users' needs.

On the basis of the survey, the research has developed a model of information needs of users in the electronic information environment. The component elements of the model are user tasks, state of existing electronic information resources and level of user experience with existing electronic information resources in each setting. The research has also substantiated that the LIS literature recognizes in one form or another that information and information needs exist as content and non-content inseparably and that the physical form in which information content is made available for users' access and use influences information needs of users.

The research concludes that the model and the related assumptions and premises have led to an alternative conceptualization that reflects features from existing conceptualizations as well as new ones. The model and the assumptions, hence the proposed conceptualization, have also allowed the research to identify alternative research focuses in order to determine information needs of users in the electronic information environment. The model further has proved its potential to contribute towards advancing theory related to information needs. Finally, the research gives recommendations for immediate implementation of the results of the research as well as further studies.



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## LIST OF ABBREVIATIONS

|        |   |
|--------|---|
| ASK    | Anomalous state of knowledge                        |
| ARIST  | Annual review of information science and technology |
| CABI   | Commonwealth Agricultural Bureaux International     |
| CD-ROM | Compact disk - read only memory                     |
| GIS    | Geographic information system                       |
| ICTs   | Information and telecommunications technologies     |
| IR     | Information retrieval                               |
| ISE    | Information seeking experience                      |
| IUE    | Information use environment                         |
| LDCs   | Least developed countries                           |
| LIS    | Library and information science                     |
| MIS    | Management information system                       |
| MOHAWC | Models of Human Activities in Work Context          |
| NII    | National information infrastructure                 |
| OPAC   | Online public access catalogue                      |
| SPIN   | Strategies and policies on information              |
| STI    | Scientific and technical information                |



## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background and justification of the study

The importance of understanding information needs of users for both theoreticians and practitioners alike has been one of the constant themes of the literature of library and information science (LIS). Vickery (1997) notes that the information profession starts with people needing information. Allen (1997) stresses that it is a first and indispensable step in designing and building effective information systems. Nicholas (1996) argues that "The routine collection and analysis of ... information needs data should be a central management activity". In the electronic information environment the message is still the same as the following statement indicates:

The success of institutional networking endeavour - and national efforts, such as those associated with the National Research and Education Network or, more broadly, the National Information Infrastructure (NII) - will depend on the development of network features, policies, and support programs that are based on a solid knowledge of users' needs and habits and substantiated links between network use and engineering outcomes (Bishop, 1994, p. 695).

Westbrook sums up well the necessity to understand information needs of users by stating that "Information needs underpins the work of both information systems designers and practising librarians"(1997a, p.316 ). As a result, the information needs of users have been one of the major areas receiving research attention and documentation of research results in LIS. According to Wilson (1999) several thousands of reports and journal papers exist on information needs and information seeking.

This long tradition of research effort however, has not, to many scholars, made satisfactory contributions towards informing information system development. Neither has it contributed to the overall understanding of the concept of information needs



(Allen, 1996; Brittain, 1975, 1982; Dervin and Nilan, 1986; Devadason and Pratap Lingam, 1997; Greene, 1990; Hewins, 1990; Itoga, 1992; Julien and Duggan 2000; Morris, 1994; Nicholas, 1996; Palmquist and Kim, 1998; Rohde, 1986; Wilson, 1994). Morris (1994, p. 20) describes the state of information needs research as follows:

Much of the dissatisfaction with current research and practice in information needs was captured in Dervin and Nilan's 1986 ARIST review. Frustration on the part of information professionals stemmed from, among other things, the proliferation of systems that puzzled or irritated users and from nagging suspicion that the needs of users were not well understood. Researchers were concerned by the lack of a strong theoretical base from which to design systems and services and by the lack of replication and of building on existing research (Dervin and Nilan, 1986). Not surprisingly, research has failed to inform practice.

Greene comments that the results of much 'user studies' research in LIS have been unsatisfactory (1990).

Many scholars believe that the research methodologies in use have been the reason for the unsatisfactory results. Hewins (1990, p. 162) comments that "a continuing theme throughout all the ARIST chapters has been the criticism of the research methods used in information need and use studies". Durrance concludes that "Overall there is widespread dissatisfaction with the research methods used and assumptions made by many researchers" (1989, p. 127). Devadason and Pratap Lingam (1997, p. 50) also note that "In actuality, the methodology used for most studies have been found inadequate for uncovering users' real needs which have been difficult to discover, measure and classify".

Lack of a unifying theory of information needs is also believed to be the reason for the unsatisfactory results (Dervin and Nilan, 1986; Durrance, 1989; Hewins, 1990; Morris, 1994; Rohde, 1986; Wilson, 1994). A unifying theory is viewed as a necessary framework to guide research as well as to make sense of the scattered findings accumulated from past information needs research. Durrance reflects that the lack of meaningful theories of information needs has been considered as one of the reasons for failure in information needs research: "Arriving at meaningful theories is a painstakingly

slow process that still continues. Indeed, the lack of a good theory of information needs is considered contributory to the fact that changes in information retrieval systems are almost totally technology-driven” (1989, p. 127). Morris implies that it is lack of persuasive theoretical underpinning in information needs that is hindering changes in information system development and management (1994, p. 20).

However, this research is of the view that the root cause of unsatisfactory results in information needs research is the use of an inadequate conceptualization of information needs and related concepts. Conceptualization in this research refers to definitions and/or assumptions regarding the essence of a phenomenon of study. Conceptualization reflects what constitutes the phenomenon under study and the nature of the constituent elements and/or the phenomenon as a whole. It describes what the phenomenon is and specifies the assumptions held regarding the essence of the constituent elements and other relevant aspects of the phenomenon. Similarly, in this research conceptualization of information needs refers to what constitutes the information needs of users and other necessary assumptions regarding the nature of the constituent elements or information needs as a whole. It reflects the essential nature of information needs.

Conceptualization is considered here as a root cause of the unsatisfactory state of information needs because it determines the selection of research focuses and methodologies to use in information needs research. The chosen conceptualization of a phenomenon under study reflects what is believed to be the essence of the phenomenon. The conceptualization indicates what is considered to be important about the phenomenon. Consequently, conceptualization points out in general terms what issues and aspects of the phenomenon need to be studied in order to understand the nature of the phenomenon. It points out which constituent parts or variables need to be dealt with. In this connection, Rohde (1986) indicates that a given conceptualization of a phenomenon under study helps in identifying variables to focus on. The writer adds that conceptualization provides guidance and criteria for choosing among variables. Dervin and Nilan state that assumptions and premises point to variables to focus on and research



questions to address (1986). Similarly Itoga states that conceptualization points out what “research issues to be pursued” (1992).

Conceptualization also provides clues as to the appropriate research methods to use in studying the phenomenon under consideration. The identified issues and aspects of the phenomenon for research in turn determine the nature and type of data to be collected as well as the techniques to be used for collecting and analysing the data (Bradley and Sutton, 1993; Jarvelin and Vakkari, 1993; Palmquist and Kim, 1998; Savolainen, 1993; Sutton, 1993; Westbrook, 1994). Bradley and Sutton (1993) argue that the assumptions about reality under consideration determine the issues and problems to be dealt with and the methodological approaches to be adopted. Dervin and Nilan point out that methodological choices are rooted in conceptualization (1986). Palmquist and Kim (1998) stress that research methods are chosen on the basis of their appropriateness for answering the research questions posed. Therefore, adequate conceptualization facilitates the identification of research focuses and appropriate research methodologies. In this way, conceptualization directly determines the nature and to some extent the outcomes of research. In agreement with this view, Dervin and Nilan conclude that conceptualization drives research (1986).

This holds true in information needs research in that the conceptualizations of information needs and related concepts used by researchers influence their choices of research focuses and methodologies. As Rohde (1986) points out, the views and assumptions that researchers hold about information needs are reflected in the methodologies chosen by the researchers.

Two rather contrasting conceptualizations are recognized to have been guiding information needs research in LIS. These are widely known as system-oriented and user-oriented conceptualizations. Although each conceptualization has brought to light essential understandings about information needs of users, none has been fully embraced by the profession as being satisfactory.

Dissatisfactions with the system-oriented conceptualization and associated research focuses and methodologies have been surfacing since the 1960s (Bystrom and Jarvelin, 1995; Devadason and Pratap Lingam, 1997; Dervin and Nilan, 1986; Fidel, 1993; Itoga, 1992; Kaniki, 1995a; Krikelas, 1983; Morris, 1994; Nahl, 1998; Palmquist and Kim, 1998; Sugar, 1995; Westbrook, 1997a; Wilson, 1999). The system-oriented studies have been criticized for focusing on aspects that do not constitute information needs of users and that do not reveal the real nature of the concept of information needs. The system-oriented studies basically focus on demands and needs as expressed by users as well as on observable human behaviour such as visits to libraries as indicators of the information needs of users. These studies have also been criticized for employing methodologies that are not appropriate to learn the real information needs of users. Consequently, the research results of system-oriented studies have been criticised as being inadequate in informing the development and operation of information systems and in helping the profession grasp the essence of information needs.

Doubts about user-oriented conceptualization and associated research focuses and methodologies have also been emerging (Allen, 1996; Gorman and Clayton, 1997; Itoga, 1992; Savolainen, 1993; Sutton, 1993; Westbrook, 1997a). They are criticized for focusing on human beings' internal and mental states which are difficult to deal with. They have been criticized for emphasizing the information needs of individuals, as opposed to groups, which is believed to be too difficult for any information system to cater for. They have also been criticized for focusing on the subjective nature of information, as opposed to the objective. More importantly, user-oriented conceptualization is doubted because it is at an early stage of development. Although hailed as promising by some, the user-oriented conceptualization and associated methodologies are shown to be at too much of an early stage to adequately guide information needs research (Dervin and Nilan, 1986; Itoga, 1992; Nahl, 1998; Palmquist and Kim, 1998; Westbrook, 1997a). Some writers acknowledge that the user-oriented conceptualization and methodologies are being adapted to the circumstances of information needs research (Westbrook, 1997a). Other scholars point out that user-oriented conceptualization and associated research focuses and methodologies have a



long way to go before being able to provide a complete framework to guide information needs research (Morris, 1994; Nahl, 1998). Furthermore, despite the continued criticism of the system-oriented research focuses and approaches, the information needs research tradition has not changed much in favour of the emerging user-oriented ones (Hewins, 1990; Jarvelin and Vakkari, 1993; Julien, 1996; Julien and Duggan 2000; Powell, 1999).

The literature, thus, clearly indicates that the inadequacy of the existing conceptualizations has led research in information needs to be conducted without uniformly accepted conceptualization and associated research focuses and methodologies. The inadequacy has left information needs research without a uniformly employed research framework on which to build theories in the area. Appropriate and standardized research methodologies generate generalizable research results which are needed to develop theories regarding the phenomenon under study (Rohde, 1986). This has made the research to be short of informing information system design and management that could facilitate the meeting of user needs. Therefore, information needs research is in need of sound conceptualization despite its continued use of these two groups of conceptualizations.

This research is of similar view in that none of these two group of conceptualizations has provided a widely accepted and adequate conceptualization of its own. None is in a position to provide a complete conceptualization and associated research focuses and methodologies by its own. Furthermore, the current research also finds these two conceptualizations inadequate in that none has reflected the following essential characteristics of information needs in a clear and balanced manner:

- 1       that information needs are both carrier and content related in an inseparable way
- 2       that information needs vary from one type of information environment to another, that is information needs in the print information environment are different from those in the electronic information environment

In conclusion, it is the view of this research that information needs research still requires a sound conceptualization and associated research focuses and methodologies in order to

serve its purposes well. This research specifically argues that an alternative way of looking at the essence of information needs of users is needed in order to generate sound research focuses and select appropriate methodological approaches. With research focuses and methodologies rooted in sound conceptualization, the unsatisfactory state of research into information needs can be well addressed.

## **1.2 Statement of the research problem**

The inadequacy of existing conceptualizations of information needs of users and related concepts is put forward as being behind the unsatisfactory progress in information needs research. It is further argued that an alternative conceptualization which is capable of providing alternative ways of looking at the essence of information needs of users and pointing out alternative research focuses and methodological approaches is needed.

This research is of the view that addressing the shortcomings of information needs should receive the utmost attention. Particularly research that would allow us to see information needs in a new light is needed. A fresh look at what constitutes the information needs of users and accompanying research focuses and methodologies is necessary to improve on existing conceptualizations. One way of addressing the problem would be to put together useful features from each conceptualization as well as to add new features that seem to be lacking in both. It has been recognised that each conceptualization has contributed to what the profession currently knows about information needs of users in its own way (Brittain, 1982; Durrance, 1989; Itoga, 1992). And this means that each has features to commend it. This could help to develop a widely accepted and applied conceptualization and associated research focuses and methodologies. To this end, this research attempted to contribute towards addressing the shortcomings in information needs by developing a model of the information needs of users and identifying a set of assumptions and propositions. The assumptions and the propositions are mainly related to the nature of information needs that have been pointed out above and that have been undermined by the existing conceptualizations, namely, that information and information needs are content and non-content related inseparably



and that the physical form in which information content is made available influences the information needs of users.

Generally a model is a simplified representation of a phenomenon under study. It is built basically to understand the essence of the phenomenon or gain new insight about the phenomenon. Developing a model is chosen here for the potential that models have for specifying what constitutes the essence of the phenomena of interest. Models also have the potential for facilitating the identification of research focuses and approaches in order to study the phenomena. With a set of assumptions accompanying it, a model can provide a conceptualization to guide research related to the phenomenon. Accompanying assumptions are usually necessary to give additional essential information that can not be revealed by the model alone about the phenomenon being modelled. More specifically the following potential uses of model building are considered relevant in the current research:

- 1 Models are useful for specifying what constitutes the phenomena of interest. A model consists of elements or concepts that constitute the phenomenon it is modelling. The elements in the model are meant to tell what the phenomenon is made up of. The elements or the concepts used in the model reflect how the phenomenon being modelled should be seen and understood. Each element or concept in the model stands for what is believed essential and needs to be known about the phenomenon being modelled. Thus, models specify clearly what modelers believe to constitute the phenomena of interest. In the same way, by modelling the information needs of users, we can specify what elements or concepts constitute information needs. Such a model will describe and communicate what we believe to constitute the essence of information needs. This will provide the core alternative understanding that we have to have of information needs. Relevant assumptions on additional essential natures of information needs that the model may not be able to show will then be identified and discussed alongside the model to further develop and communicate the complete conceptualization of information needs of users. Some writers refer to the above use of a model as the conceptualization role of models (Camm and

Evans, 1996, p. 13; Miller and Wilson, 1984).

- 2 Models help in identifying research focuses in studying the phenomena they model. In this case models specify the variables about which data need to be collected in order to understand the phenomena they model. Each element of a model can serve as a variable on which data can be collected for the purpose of learning about the phenomenon. In this connection, Mouton and Marais (1993) state that models identify central problems or questions concerning the phenomena under study. Particularly in this research, the model constructed will be used to develop a data collection and analysis framework for use in studying information needs of users in the electronic information environment. The framework will help to identify aspects on which specific data need to be collected for determining the information needs of users in the electronic information environment. Use of models as a basis for developing research frameworks is common in LIS as the review of related literature will show in the second chapter of this thesis. Identifying aspects about which data need to be collected further facilitates the choice of research approaches because clearly identified research focuses or questions make such choices easy.
- 3 Another use attributed to models is that they can be used to advance theory about phenomena under study. Models specify variables and their relationships representing the phenomenon. Statements of variables and their relationships about a phenomenon are also the essence of a theory (Britt, 1997; Powell, 1997). In the literature it has been shown that models are precursors to theories and that they evolve into theories (Doran and Gilbert, 1994; Keeves, 1994; Mouton and Marais, 1993).

All these uses of models hold the potential to address the shortcomings of information needs research as discussed earlier. With a model and related assumptions and premises related to information needs, this research further advocates that the issues of conceptualization, research focuses and methodological approaches and theorization can all be addressed step-by-step and in an integrated manner, where one will be building on the earlier achievements. More specifically, addressing the issue of conceptualization



first with the needs of methodological and theorization issues in mind, and addressing the issue of methodological issues and theorization after developing sound conceptualization can be done as modelling has the potential to facilitate this approach.

Identification of assumptions and premises particularly those related to the nature of information needs and related concepts that have been argued in this research to have been undermined by the existing conceptualizations was necessary for a number of reasons. First, discussion of the assumptions was necessary to establish that the literature of LIS has recognized that information and information needs exist as content and non-content inseparably in one form or another. This discussion helped the argument of the research that both the content and non-content nature of information needs and related concepts have to be reflected in the conceptualization of information needs. Second, the discussion was necessary in order to bring to light what constitutes content and what constitutes non-content aspects of information needs. Third, the discussion was necessary to show how the physical form of information comes into the picture in influencing the information needs of users. Finally, the discussion of the assumptions and premises was needed to bring to light more insights about the essence of information needs which the model alone cannot reveal. The model alone cannot reveal everything about the essence of the phenomenon it models, although it is a sound tool to reveal essential features of the phenomenon it models. Further elaboration in the form of related assumptions supplements the model's role in revealing the essence of information needs. It is the model and the related assumptions and premises that provided the material for developing the alternative conceptualization.

Taking cognizance of the role that the information environment has in determining the nature of the information needs of users, a specific information environment, namely, the electronic information environment will be considered as a context in developing the model. As will be discussed in Chapter three of this thesis, it is the view of this research that the nature of the information needs of users varies from one information environment to another. Focus on the electronic information environment is also appropriate and advantageous because the major development in the information scenario

globally is the emergence and consolidation of the electronic information environment where information is being captured, processed, stored and exchanged largely in electronic form. As will be discussed later in Chapter Three of this thesis, electronic information environment is where potentially relevant information content exists in electronic carriers for users' access and use. With the emergence and fast growth of the electronic information environment, concern for effectively meeting the information needs of users also continues to be one of the major issues of information system design and operations. For various reasons, some authors also suggest that users' needs assessments is needed in the electronic information environment more than in other information environments (Nicholas, 1996).

### **1.3 Aims and objectives of the study**

The main aim of the research was to contribute towards addressing the shortcomings in information needs research by developing a model of the information needs of users and identifying related assumptions and premises particularly in the electronic information environment. The research specifically aimed to develop a model and identify relevant assumptions and premises related to information needs particularly in the electronic information environment which could

- help in gaining more insight into the information needs of users
- allow one to develop an alternative conceptualization of information needs of users in an electronic information environment
- help improve the research approach in information needs research
- contribute towards theorization about the information needs of users in the electronic information environment

To realize its aim, the research kept a broad objective of developing a model of information needs of users by identifying variables and their relationships appropriate for describing and understanding the information needs of users in the electronic information environment and by identifying assumptions and propositions regarding the nature of information needs to be used alongside the model. In line with this broad objective, the



research had the following specific objectives:

- To identify the factors affecting the content and non-content needs of users in electronic information environment. This objective covers the identification of factors affecting content needs and non-content needs.
- To identify in what ways each factor affects the information needs of users in the electronic information environment
- To construct a model of the information needs of users in an electronic information environment using the identified factors and their relationships
- To identify assumptions and propositions regarding information needs and related concepts to be considered or emphasized in the alternative conceptualization
- To put forward recommendations and suggestions on how to employ the model and the related assumptions and premises to contribute towards addressing the shortcomings identified above in information needs research.

To guide the research, the following research questions were posed and addressed:

- What variables and relationships among them represent the essence of the information needs of users in an electronic information environment?
- Which of the variables and their relationships influence which aspects of the information needs of users in the electronic information environment?
- What assumptions and propositions regarding information needs and related concepts should be considered or emphasized in an alternative conceptualization of the information needs of users?
- In what specific ways can the model and the assumptions and the premises be used to address the problems discussed above?

#### **1.4 Scope of the study**

The scope of the research is limited to developing an information needs model of users and to the identification of relevant assumptions and propositions regarding information needs and related concepts. The model developed is specifically for the electronic information environment, as such models should be distinct for each particular



information environment or each distinct form in which information content is made available for access and use.

### **1.5 Methodology of the study**

The research used secondary data to develop the model and identify relevant assumptions and propositions regarding information needs and related concepts to be considered in the alternative conceptualization of information needs. Due to the fact that the thesis was aimed at model building, the methodology used in the study was as extensive literature review to identify key elements of the model and related assumptions. It is the view of this research that the model can be constructed based on information from the existing literature on the information needs of users. The long tradition of research into information needs and related concepts has accumulated a body of literature that can be consulted for the purpose. Therefore, by looking at what the literature so far has to say on the information needs of users from a particular perspective this research has constructed a model which will help in developing the alternative conceptualization for use in information needs research. More specifically, the literature was surveyed primarily to identify factors affecting both content and non-content needs of users in the electronic information environment and their relationship in affecting information needs of users. Factors affecting the information needs of users can be used to represent the essence of information needs of users. This is further discussed in Chapter four of this thesis. The literature survey was also used to identify the necessary assumptions and propositions regarding information needs and related concepts to be used alongside with the model.

### **1.6 Organization of the thesis**

The thesis is organized into six chapters. The first chapter introduces the research problem, the proposed approach to address the research problem, and the aims, objectives, scope and research methodology of the research. The second chapter discusses literature related to the research problem and the proposed approach to addressing the problem. The next three chapters cover the discussion of relevant

assumptions and premises regarding information needs and the development of the model of information needs of users in the electronic information environment proposed as an approach to address the research problem. Accordingly, Chapter three presents the necessary assumptions and propositions that form part of the conceptualization. Chapter four deals with the identification of elements and relationships that make up the model. Chapter five discusses the model. Finally, Chapter six presents conclusions and recommendations of the research.

## **1.7 Summary**

Determination of information needs of users is one of the primary areas of research in LIS. However, for many researchers information needs research has not made a satisfactory contribution to informing information system development and the overall understanding of the concept of the information needs of users. Although many researchers have reflected their dissatisfaction with information needs research in one form or another, this research argued that inadequate conceptualization of information needs has been at the root of the shortcomings. The research further argued that what is needed is an alternative conceptualization to the existing conceptualizations, that is, system-oriented and user-oriented. To develop an alternative conceptualization of information needs, the research set out to construct a model of the information needs of users in an electronic information environment and to identify necessary assumptions regarding the nature of information needs based on secondary data from LIS literature.



## CHAPTER TWO

### REVIEW OF RELATED LITERATURE

#### 2.1 Introduction

This chapter presents a review of LIS literature related to the area of the research problem and the proposed intervention to address the research problem. The research problem is that there is a need for an alternative conceptualization of information needs because none of the existing conceptualizations currently guiding information needs research is adequate on its own. A conceptualization which recognizes that information needs relate to both the carrier and the content of information and that information needs of users vary from one information environment to another in a balanced manner is lacking. The intervention proposed is the development of a model of information needs and the identification of accompanying assumptions that could facilitate an alternative way of understanding the essence of information needs of users. A set of assumptions and propositions related to the nature of information needs accompanies the model in order to give additional insight regarding the nature of information needs that are not possible to communicate through the model alone. Accordingly, the review covers a discussion of the state of information needs research, conceptualization in the context of information needs research, and the existing conceptualizations in use in information needs research. It also covers the understandings of models and modelling approach adopted in developing the model of information needs of users in this research. Discussion of models of information needs is also a part of this section of the chapter. An attempt will be made to show similarities and differences between the nature of existing models and that of the current research. The discussion in this chapter is organized under two main parts. While the first part presents the discussion related to the conceptualizations in information needs research, the second part deals with the modelling aspect of the research.

## **2.2 Conceptualizations in information needs research**

The main focus of this section is the discussion of the basic features of existing conceptualizations in information needs research. However, before going into the discussion of the features of the existing conceptualizations, this section presents a review of critical views of the state of information needs research and the role of conceptualization in it. The discussion is intended mainly to establish that the shortcomings in the research into information needs are recognized widely and that an alternative conceptualization is what is needed to address the shortcomings in the research.

### **2.2.1 Critical views of the current state of information needs research**

Dissatisfaction in one form or another with the state of information needs research has been consistently reflected in LIS literature for a long time. A clear concern, particularly over the general failure of information needs research to inform the design and operation of information systems and overall understanding of the essence of information needs, has been one of the frequent issues in the literature on information needs. Sound design and operation of information systems is critical for the LIS profession in order to achieve one of its central purposes, namely, meeting the information needs of users.

The dissatisfaction with the state of information needs research is reflected in LIS literature in different ways. Some scholars explicitly argue that information needs research has failed to live up to its expectations of informing the design and development of information systems. Brittain (1982, p. 144) states that "One of the major problems is that the results of many hundreds of user studies have not accumulated to form a body of knowledge about the information needs of users, from which conclusions can be drawn about the way existing information services can be improved, and about the design and development of new ones". Durrance (1989, p. 127) stresses that "in spite of the volume of work done so far, we are still at a fairly rudimentary stage in our ability to translate information needs into meaningful library service components". Morris (1994, p. 21)



arrives at a similar conclusion that research in information needs and uses has failed to inform practice. Morris describes this state of information needs research as follows

Much of the dissatisfaction with current research and practice in information needs was captured in Dervin and Nilan's 1986 ARIST review. Frustration on the part of information professionals stemmed from, among other things, the proliferation of systems that puzzled or irritated users and from nagging suspicion that the needs of users were not well understood. Researchers were concerned by the lack of a strong theoretical base from which to design systems and services and by the lack of replication and of building on existing research (Dervin and Nilan, 1986). Not surprisingly, research has failed to inform practice (1994, p. 20).

Rohde (1986, p. 50) also acknowledges the difficulty in applying the findings of information needs research because of the general inconsistencies of the results.

Other researchers stress that information needs research has not yet helped the profession to gain a solid grasp of the essence of the information needs of users. Knowledge of the essence of information needs is essential for the design of relevant information systems that meet users needs. Itoga (1992, p. 332) states that despite years of information needs research "we are still left with the uneasy feeling that we are only able to grasp the sense of human information needs at the most superficial level". Reneker (1993, p. 487) comments that "Despite the proliferation of studies, however, we have a very limited understanding of the processes that drive information seeking [that is, information needs] or the variables that influence it". Kaniki (1995b, p.14) observes that "It is evident from the literature over the years that there is still continuing debate on the understanding of the concept of information need(s), assessment and identification of information need(s), and satisfaction of information needs(s)". Allen concludes that user studies have provided little solid information on information needs in general and the shortcomings of these studies have led researchers to look for alternative ways of understanding information needs (1996, p. 60). Palmquist and Kim also broadly point out that there are still important aspects about information needs of users that are not yet well understood (1998, p. 21).

Some researchers also feel that the research tradition has not equipped them well to tackle information needs problems. Many LIS professionals still find it difficult to determine information needs of users with ease and efficiency. Rohde observes that the concept of information need has proved to be an elusive one, difficult to define, isolate, and measure (1986, p. 52). Dervin and Nilan (1986, p.17) reflect that the concept of information needs is universally considered troublesome. Greene considers that a lack of the means of determining information needs, which is not observable, has caused dissatisfaction with information needs research (1990, p. 67). Savolainen describes information needs as elusive (1993, p. 25). For Wilson (1997, p. 552) information needs have proved intractable. Other writers also agree that determination of information needs is a complex task (Allen, 1996, p. 14; Krikelas, 1992, cited in Reneker, 1993, p. 488; Rubin, 1998). Most of the writers above indicate that the issue of the difficulty in determining the information needs of users is a common problem in LIS profession.

Finally, some researchers see slow progress being made in important areas of information needs. Wilson (1999, p. 250) comments that despite the long history of research, some researchers in the area are dissatisfied because of the lack of a body of theory and empirical findings that may serve as a foundation to build on with sound research. Westbrook (1997a, p. 321) agrees that the search for a unifying theory of user needs is still continuing. Theory building is considered as one of the indicators of the accumulation of useful knowledge and the maturity of a given area of research.

Recent research reports have also shown that the state of information needs research has not changed much in terms of its research tradition. After reviewing the recent literature on information needs and uses research, Julien and Duggan (2000), concluded that only moderate progress is occurring in the area of information needs research. Therefore, there is a clear need to identify the causes for the unsatisfactory state of information needs research and address the causes accordingly.

As has been pointed out in Chapter one of this thesis, this research is of the view that the inadequacy of conceptualizations in the research into information needs is the primary



source of the unsatisfactory state of information needs research. In general, conceptualization of a phenomenon under study directly determines the success of the research on the phenomenon. In support of this view, Dervin (1992, p. 62) points out that all research methods are residual of theoretic effort. By this the author means that the selection of research methods is conditioned by the assumptions and propositions underlying the phenomenon under study. The author stresses that these assumptions and propositions direct research (1992). Similarly, Bradley and Sutton (1993, p. 408) argue that research methods are grounded in the point of view adopted regarding the nature of the phenomenon under investigation. Jarvelin and Vakkari (1993, p. 140) also view the choice of research methods as consequences of theoretical (that is, assumptions and propositions) choices and problem definition (that is, research focuses). In addition, it has been argued that valid concepts are the building blocks of theorization (Britt, 1997; Mouton, 1996). It is shown that theory building begins with clearly identified concepts and their relationships. This further points out that adequate conceptualization is also related to theorization.

The same applies to information needs research. Adequate conceptualization of information needs and related concepts facilitates the selection of appropriate research focuses and research methodologies. Appropriate selection of research focuses and methodologies, if followed correctly, leads to satisfactory research results. In this way conceptualization of information needs directly determines the success of its research.

In the LIS literature many researchers also acknowledge directly or indirectly that conceptualizations in use have been responsible for poor progress in information needs research. Paisley (1968, p. 5), in one of the earliest criticisms on poor conceptualization in information needs research, argues that shallow conceptualization of information needs has negatively impacted on the progress in information needs research by leaving out important aspects from the research efforts. Rohde says that some researchers associate inadequate conceptualization to be behind the poor results in information needs research. The author states that "The dissatisfaction with results of traditional studies of information needs and information-seeking behaviour has led researchers in library and

information science and in other social science fields, most notably communication, to begin questioning the assumptions underlying past research” (Rohde, 1986, p. 59). Rohde also finds out that what was (or was not) studied, the methodologies chosen, and the frame of reference for the studies were identified by some of the above writers as the specific causes for the lack of progress in information needs research (1986, p. 58). The choices of what to study and the methodologies to use according to this research are consequences of the chosen conceptualizations. Itoga states that the failure to adequately conceptualize the central question of information needs has made our understanding of the concept superficial (1992, p. 332). Savolainen (1993, p. 18) argues that user- and system-oriented conceptualizations have specific methodological implications in that the research focuses of each conceptualization, and hence the methodologies followed, are unique to each conceptualization. Hjørland (1997, p. 159) even goes further by arguing that our understanding of information needs impacts on our understanding of related information behaviours such as information seeking and information retrieval. In addition, Allen (1996), Itoga (1992), and Rohde (1986), among others, have observed that some researchers have long been calling for alternative approaches as a remedy to the shortcomings in information needs research. Dervin and Nilan (1986, p. 12) also make reference to a number of researchers who have approached improving the progress of information needs research primarily through introducing alternative premises and assumptions regarding information needs and related concepts.

From the discussions above, it can be concluded that there is a need to address the unsatisfactory state of information needs research. It can also be concluded that perhaps the first place to start in improving the unsatisfactory state of information needs research is the conceptualization of information needs and related concepts. Furthermore, widely accepted conceptualization is essential because it facilitates the sharing of common research focuses and associated methodologies among researchers in the area of information needs. Such uniformity in research focuses and methodologies allows for generalization of research findings leading to theory building. This further provides the basis for design and implementation of sound information systems. As pointed out in Chapter one of this thesis, this research aims at addressing the shortcomings of



information needs research by developing a model of information needs that will facilitate an alternative conceptualization or way of looking at information needs. The model will be accompanied by assumptions and propositions that will bring to attention additional information about the essential nature of information needs.

It will be appropriate at this stage to discuss the relevant features of existing conceptualizations underlying information needs research. Two groups of conceptualizations, namely, system-oriented and user-oriented conceptualizations, have been guiding research into information needs in LIS. These two conceptualizations are discussed in the subsequent sections of this thesis. The features selected as relevant for the discussion of this research are assumptions and propositions regarding information needs and related concepts, research focuses, research methodologies and criticisms against each conceptualization. Specifically the discussion aims to:

- establish that there are two different conceptualizations guiding information needs research
- provide the basic features of these two conceptualizations in order to show the essence of each and what each deals with. This will also help to bring to light useful features of each conceptualization for consideration in the proposed alternative conceptualization.
- assert that none of these conceptualizations has been widely accepted among information needs researchers. Implied under this point is that none has provided adequate conceptualization and associated research focuses and methodological frameworks of its own.
- provide background reading in order to determine whether the proposed alternative conceptualization provides another way of looking at information needs. Whether the proposed alternative conceptualization provides a new way of looking at information needs can be assessed by contrasting it with the existing ones.

The discussion below starts with system-oriented conceptualization where its assumptions, research focuses, research methodologies, and criticism against it are

presented. This will be followed by a discussion on user-oriented conceptualization.

### **2.2.2 System-oriented conceptualization of information needs**

The system-oriented conceptualization or view of information needs has been dominant in use since formal research in information needs started to appear. In the system-oriented conceptualization, information needs are assumed to be what users need from information systems, existing by their own, observable, static, and user specifiable (Belkin and Vickery, 1985; Bruce, 1997; Cole, 1999; Dervin and Nilan, 1986; Itoga, 1992, p. 333; Palmquist and Kim, 1998; Rohde, 1986; Sugar, 1995, p. 78; Westbrook, 1997a). The following paragraphs discuss each of these system-oriented assumptions regarding information needs.

In system-oriented research, information needs have been assumed to be what users need from their information systems. In other words, there has been no concern about what information needs bring users to the system in the first place. This view calls for emphasizing what it is that users need from what their information system has to offer. Regarding this assumption of system-oriented conceptualization, Dervin and Nilan conclude that "Almost without exception 'information needs' have not been defined as what users think they need but rather in terms that designate what it is in the information system that is needed. The definitions have not focussed on what is missing for users ([that is], what gaps they face) but rather on what the system possesses" (1986, p. 17). Similarly, Sugar notes that "The traditional systems view considers information need in terms of what the system possesses rather than according to gaps in user's knowledge. The systems perspective assumes that the filling of an information need can be understood in terms of how users have used or might use information system" (1995, p. 78). Information needs surveys that ask users to select from the list of information sources offered by their libraries are instances of manifestations of this assumption in system-oriented studies.



Information needs of users are also assumed to be observable by others much as physical phenomena can be. This assumption is concerned with externally observable information behaviours of users as constituting information needs. For example, proponents of the system-oriented conceptualization assume that it is possible to know what the users' needs are or might be by assessing how users have used or might use systems (Dervin and Nilan, 1986, p. 10). Rohde (1986, p. 52) also notes that the object of the system-oriented study has been observable user behaviour and/or expressed demands, the assumption being that needs are implied by demands and information seeking activities.

Information needs are also thought to objectively exist on their own in the system-oriented conceptualization. According to this assumption what is important is only the need and its specification (Belkin and Vickery, 1985, p. 7). This means that no concern is given to what leads to information needs which resulted in the users' approaching information systems. This also ignores what users do with information content once they acquire it from relevant information sources. In relation to this, Belkin and Vickery comment that "A recurring theme is that, until the 1970s, there are almost no studies of why people engage in information-seeking behavior and only a few which even attempt to relate the concepts of information need and information use" (1985, p. 9). Dervin and Nilan also state that "Traditional information needs and uses studies have zeroed in on user behaviour primarily in the context of user intersection with systems. They have not examined factors that lead to a user's encounter with information systems or the consequences of such an encounter. It is as if a still photograph were taken of a scene that would be more adequately portrayed by moving pictures"(1986, p. 14).

Another assumption of the system-oriented conceptualization is that information needs are user specifiable or sharable with others. In this connection two senses of sharability are reflected by the system-oriented conceptualization. The first sense is that user groups such as social groups have common information needs. As a result of this view research has been attempting to determine information needs of individuals on the basis of the information needs of the groups to which the individuals belong. Hewins (1990, p. 148, 164) notes that the system-oriented approach assumes that by studying the groups to

which the users belong, it is possible to determine the information needs of the individual users. Dervin and Nilan also point out that the system-oriented studies assume that the information needs of users can be inferred from the knowledge of the groups to which users belong (1986). The second sense of the sharability of information needs as reflected in user-oriented conceptualization, is in the sense that users can share or articulate their information needs to others. Itoga reflects that the system-oriented research assumes that “a person’s information needs can be shared with others in the forms of asking, interviewing, or observing him, or some other ‘scientific’ methods” (1992, p. 333). Information needs studies that ask users what sorts of information services they would like in addition to those being offered are examples of studies which are based on the assumption that users know what information they need, including the delivery mechanism (Belkin and Vickery, 1985, p. 8). The view that users can communicate their needs has led to researchers depending on what users express as to their information needs, in determining their needs.

The conception that information needs are user specifiable also implies that users have no problem understanding what information they need and articulating that to information systems or researchers of information needs. According to this assumption users can understand and specify what information they need without the help of interaction with relevant information sources and services. This, as indicated above, has led researchers to depend on what users express their needs to be for the purpose of determining users’ information needs.

Finally, in the system-oriented conceptualization, information needs are assumed to be static. According to this assumption users’ information needs will remain the same at all times and places. This assumption views information needs to remain the same irrespective of changes in user situations (Dervin and Nilan, 1986, p. 14). Palmquist and Kim (1998, p. 8) observe that the system-oriented conceptualization assumes that information needs would stay the same across time and space. Ingwersen (1995, p. 160) points out that the system-oriented conceptualization presupposes that information needs are stable. Cole (1999, p. 546) observes that in system-oriented approach, information



needs are assumed to remain invariable over the course of the user interaction with potentially relevant information sources and systems. Information needs studies that focus on past needs can be considered as one instance of the static assumption maintained by the system-oriented conceptualization. It is assumed in these studies that past information needs which have been identified remain constant. These studies infer current and future needs of users based on past needs. Information needs studies that determine information needs of users based on users' initial expressions of needs also reflect the assumption that information needs of users remain constant. Once recognized, information needs remain the same according to this assumption.

In addition, the system-oriented view has its own assumptions about issues that have direct bearing on understanding information needs, namely, information and information users. In the system-centered view, information is treated as objective, that is, as something that has constant meaning and some element of absolute correspondence to reality while users are considered as passive receivers of objective information (Dervin and Nilan, 1986, p.13; Itoga, 1992, p. 336; Morris, 1994, p. 21; Nahl, 1998; Palmquist and Kim, 1998; Rohde, 1986, p. 62; Sugar, 1995, p. 78).

According to Rohde information in the system-oriented view is seen "as having an existence independent of thought or of sources or of receivers and as something that describes reality which can be discovered, described, and predicted ...The image which emerges is of an object (sometimes described as a brick) which can be transferred from one place to another ..." (1986, p.51). Similarly Morris (1994, p.21) notes that the system-oriented conceptualization considers information "as external, objective, as something that exists outside the individual".

Information users are also considered as passive and empty receptacles of information. This assumption does not recognize that users are the ultimate judges of what information they are lacking and what is relevant for them to fill the gaps in their knowledge. The assumption also does not recognize that users' active and purposive interaction with potential information sources is critical to make the best of existing

information resources. In this connection Rohde observes that "The traditional view ignores the fact that human beings create their own reality, that they have their own internal information stores which they use to make sense of 'external' information and of the situations in which they find themselves at any given time" (1986, 52). Hewins (1990, p. 146) also points out that system-oriented approach assumes the users as being passive recipient of information and expects the users adapt to the information-provision mechanisms rather than the mechanism's adapting to the user's particular characteristics.

### **2.2.2.1 Research focuses under the system-oriented conceptualization**

In line with its assumptions and premises regarding information needs of users, the research in system-oriented conceptualization predominantly focuses on the observable dimensions of information behaviour and events (Bruce, 1997; Dervin and Nilan, 1986; Savolainen, 1993; Westbrook, 1997a). The system-oriented research also focuses on user group information needs rather than individual information needs (Allen, 1997; Belkin and Vickery, 1985; Chu, 1999; Dervin and Nilan, 1986; Hewins, 1990; Palmquist and Kim, 1998; Rohde, 1986; Savolainen, 1993). It further focuses on users' needs as occurring only within the context of user- system interaction (Belkin and Vickery, 1985, p. 8; Chu, 1999, p. 247; Dervin and Nilan, 1986, p. 11; Palmquist and Kim, 1998, p. 8; Rohde, 1986).

#### **2.2.2.1.1 Focus on observable dimensions of user behaviour**

The assumption that information needs are observable has led to system-oriented research to be focused only on observable dimensions of information behaviour and events. The research focus on the observable dimensions of information behaviour and events is manifested in different ways. It is reflected in researches that focus on measurable user behaviours such as the number of sources consulted or the number of visits to one's library as indicators of information needs. Westbrook observes that information needs research, before the emergence of the user-oriented approach, focused on the observable and measurable physical activities of people who interact with a library



building or some highly formal information system (1997a, p. 321). Savolainen also points out that system-oriented studies focus on observable information behaviours such as frequency of library use and the priority of different channels, with the view that by knowing how users have used or may use systems, one knows what their needs are or might be (1993, p. 19).

Focusing on observable dimensions is also reflected in studies that consider external behaviours such as contact with sources and frequency of use of systems as indicators of needs. Dervin and Nilan (1986, p. 15) observe that "A typical study in the system-oriented genre examines the extent to which a respondent (user or potential user of an information system) has 1) used one or more information systems, used one or more different kinds of information services or materials; 2) sees one or more barriers to the use of the information system; and 3) reports satisfaction with various attributes of the system and access to it". Savolainen (1993, p. 19) notes that the system-oriented proponents argue that by knowing how users have used or may use systems, one knows what their needs are or might be. Similarly, Bruce (1997, p. 323) states that the system-oriented research focuses on what can be observed as an overt behaviour. Palmquist and Kim (1998, p. 9) also note that system-oriented studies concentrate on variables that are external to the user characteristics like interface features and tasks rather than on variables that are internal to the user characteristics like the user's mental processes.

The system-oriented focus on the observable dimensions is also manifested in its attention to what users appear to need from existing systems rather than what users actually need. In other words, this research focus is not concerned with what users actually lack. It assumes users' needs to be limited to what their systems have to offer. This primarily ignores users' needs that cannot be addressed by the resources of existing information systems. In connection with this research focus, Dervin and Nilan (1986, p. 16) observe that a study generated within a system-oriented conceptualization would frequently focus on research questions that start with the system - the source of the packages of information that are to be transferred from system to user. Such a study looks at how much use people make of the systems as an indicator of users' needs.

Belkin and Vickery (1985) further point out that the system-oriented research equates information needs with the use of information services and is primarily concerned with identifying the sorts of information services users would like to have at a group level.

Finally the focus on observable dimensions is manifested in researches that focus on the expressed demands and wants of users as being evidence of their information needs.

Rohde (1986, p. 52) points out that “the object of most frequent study is user behaviour and/or expressed demands, the assumption being that needs are implied by demands and information seeking activities”. The focus on observable dimensions of behaviour such as users’ demands by the proponents of system-oriented conceptualization has been based on the belief that such observable behaviours can be used as indicators of need.

#### **2.2.2.1.2 Focus on information needs of user groups**

The system-oriented conceptualization also focuses on information needs at user group level. Under this focus one finds studies concentrating on user groups as well as demographic variables of users as indicators to determine information needs of individual users. Determination of user needs at a group level, such as chemists, social scientists, or managers, has been one of the focuses of system-oriented conceptualization. Hewins points out that one of the focuses of system-oriented research has been to study characteristics of a group to which the user belongs in order to determine individuals’ information needs (1990, p. 164). Allen (1996, p. 111) points out that research into the information needs of groups as a basis for determining user needs has been one of the main directions of information needs research. He adds that such studies limit themselves to discovering how user groups experience needs for information, resolve their information needs, and interact with information devices and systems (1996, p. 111). One of the main arguments for focusing on information needs at a group level has been that needs at the individual level will show too much variation for information systems to integrate and cater for (Dervin and Nilan, 1986).



System-oriented studies also focus on the demographic characteristics of users to determine the information needs of users. Palmquist and Kim(1998, pp. 8-9) state that system-oriented studies focus on demographic variables of users such as age and gender, among others, to unravel information needs of users. Dervin and Nilan (1986, p. 15) note that system-oriented research focuses on demographic variables such as age, education, sex, among others, to explain differences in information needs among users. Savolainen observes that system-oriented studies focus on demographic characteristics of users such as age, sex, education with the view that these variables should reveal the individuals information needs (1993, p. 19). Savolainen (1993, p. 19) further adds that system-oriented studies focus almost entirely on behaviour rigidified or habitualized by external socio-economic political structures and by external conditions.

#### **2.2.2.1.3 Focus on information needs within the context of user-system interaction**

System-oriented research also focuses on the information needs of users but only within the context of user-system interaction. The assumption of this research focus is in contrast to the calls by the proponents of user-oriented conceptualization for focusing on what leads to information needs and how the acquired information is used by users. Dervin and Nilan (1986, p. 11) maintain that system-oriented studies are limited to examining behaviour primarily within user intersections with the systems. Dervin and Nilan (1986, p.15) state that “System oriented are those studies which focus on behaviour of users in the context of information systems such as use of system as indicators of information needs”. Similarly, Palmquist and Kim (1998, pp. 8-9) observe that in system-oriented studies, users’ external behaviour is observed as an isolated situation. Another research focus of system-oriented studies has been on the past needs of users on the assumption that the information needs of users are static. Hewins (1990, p. 163) states that system-oriented research relies on capturing the past use of information rather than planned use. According to Palmquist and Kim, the research focuses of the system-oriented conceptualization assume that user behaviour would stay the same across time and space (1998, pp. 8-9).

#### **2.2.2.2 Research approaches in system-oriented conceptualization**

Befitting its research focuses, the research approaches employed by system-oriented conceptualization have involved predominantly direct questioning and observing of the information needs of users. Although the methods employed are many and diverse, interviews and questionnaire surveys have been the major data collection tools in system-oriented studies (Hewins, 1990; Julien 1996; Julien and Duggan, 2000; Powell, 1999). The research methodologies often applied have also been quantitatively oriented (Dervin and Nilan, 1986, p. 16; Rohde, 1986, p. 61).

The quantitative orientation of the system-oriented research is manifested in different ways. The methodological approach of system-oriented conceptualization has been quantitative in that it focuses on the observable and measurable dimensions of information behaviour. It also uses numerical data to represent occurrences of evidences of information needs of users. Quantitative approaches in general use numerical representation of variables to quantify occurrences because of the view that quantification is an objective and accurate way of describing observable aspects of realities (Gorman and Clayton, 1997).

The approach of system-oriented research has also been quantitative in that it relies on statistical analysis to arrive at generalizations and inferences of the information needs of users. Quantitative approaches rely on statistical analysis in order to make generalizations and to identify norms or patterns as a basis of description of events or persons under study. Such generalizations and inferences have been the basis on which to determine the information needs of users at a group level. It has also been the basis on which to determine the information needs of users based on the demographic variables of users.

The research approach has been quantitative as well in that it focuses on a selected few variables believed to be relevant. This methodological approach seems to be favoured because the system-oriented research focuses on selected evidence of the information



needs of users such as contact with information sources and services.

### **2.2.2.3 Criticisms against research focuses and methodologies of the system-oriented conceptualization**

The research focuses and methodologies of the system-oriented conceptualization have been criticized for leading to unsatisfactory results ever since formal research results started to be reviewed in the 1960s (Brittain, 1982; Bystrom and Jarvelin, 1995; Dervin and Nilan, 1986; Devadason and Pratap Lingam, 1997; Faibisoff and Ely, 1978; Hewins, 1990; Kaniki, 1995a; Nicholas, 1996; Rohde, 1986; Wilson, 1999). The central issues of these criticisms are that the focuses of the research are not what should be focussed on in order to learn information needs of users. This also meant that the methods used are not applicable to study the appropriate focuses of the information needs of users. The criticisms can, thus, be grouped under two categories, namely, research methodology related and research focus related.

#### **2.2.2.3.1 Criticisms related to research methodology**

Methods of data collection and analysis have to be appropriate for the nature of the phenomenon or problem under consideration (Fidel, 1993; Jarvelin and Vakkari, 1993; Westbrook, 1994). Selection of appropriate methods is also a key issue in information needs studies as in any scientific study. Methods of data collection and analysis are critical in the studies of information needs because, among others, they determine the validity and application of results of the studies. With this understanding, the research tradition of the system-oriented conceptualization for uncovering information needs of users has been the focus of criticism by many writers directly or indirectly for a long time. The criticisms on methods presented here are not, therefore, criticisms of the inherent nature of the methods, but their shortcomings specifically when used to collect and analyze data on information needs of users. The emphasis is on their inappropriateness in unraveling the users' information needs, the nature of which are not as is assumed by the system-oriented view. In general the criticisms reflect the

deficiencies that researchers experienced or witnessed in operating within the framework of a system-oriented research tradition and are not necessarily criticisms by writers with user-oriented view of information needs.

The central theme of the criticism of the system-oriented research methodology has been that the direct questioning and observation as well as the quantitative approaches are not suitably applicable to uncover the real information needs of users (Rohde, 1986, p. 50). The criticisms can be traced in one form or other from as early as the 1960s when reviews on information needs and use studies started to appear in different publications, ARIST being the major source.

In the seventies, there were writers who explicitly point out the weaknesses of the methods in learning the information needs of users. Faibisoff and Ely (1978, p. 273) state that "The methodology used to determine information needs is the same as that used in social science research. Such tools and techniques as questionnaire, interviews, diaries, observation and analysis of existing data, and experiments have the same limitations in user studies as they have in social research, mainly that one can only infer from the user's behaviour or words what is going on inside his head". They also add that "The major weakness of questionnaires and interviews is that they cannot collect actual data on behaviour as it happens"(Faibisoff and Ely, 1978, p. 273). On the issue of analysis of existing records /documents the authors comment that "The studies obviously are limited, because they reflect only that type of information requested by a formal system, which comprises less than 5 percent of all information sought" (Faibisoff and Ely, 1978, p. 273). Regarding observation, Faibisoff and Ely state that "Although the method [observation] is better for determining information-gathering habits, very little information about the subject's need can be gleaned by observation" (1978, p. 273 ). Brittain (1975, p. 428) criticizes questionnaire and interview as a tool for data collection on information needs on two accounts: firstly, that they can gather data of information needs only at one point in time, perhaps covering no more than 40 minutes of user's working day; and secondly, they do not produce data that provide a longitudinal picture of information-seeking and gathering. Brittain adds that users often find it difficult to



recall their habits or to name the most important sources of information in replying to questions in questionnaires and interviews. Finally, based on the literature of the 1970s, Jarvelin and Repo (1984, p. 208) also make reference to the wide recognition of methodological problems in the information needs and use studies: "The conceptual and the methodological problems, and the problem of usefulness or uselessness of tradition, have been recognized in the literature".

The literature of the 1980s contains similar criticisms. Brittain points out the shortcomings of the methodologies in information needs studies by arguing that "Although there has been a good deal of discussion about the inappropriateness of these methods for library research, especially in assessments of potential need and the information needs of users who are not library and bibliographically oriented, there have been few developments. There is still dissatisfaction with these methods"(Brittain, 1982, p.143).The author continues criticizing the use of the questionnaire and interview as inappropriate for the assessment of specific needs for information and data (1982, p. 142). After reviewing the literature of information needs studies, Rohde concludes that "There has been increasing dissatisfaction with this model [traditional model] in the social sciences, generally, and in areas of study involving information needs and information-seeking behaviour, particularly ... A more holistic, non-quantitative, and non-analytical approach is being called for...(1986, p. 59). Hewins (1990, p. 162) comments on the state of methods in information needs and uses studies in the 1980s as follows:

Very few really innovative methods have been developed, leading one to question the validity of the assumptions and approaches used in the past to form frameworks for these studies. The questionnaire and the survey are the norm. Variations of these two methods dominate the literature. The problems of the questionnaire and the survey have been adequately reviewed elsewhere, but these two methods continue to be used predominantly to gather data about users, systems, and services.

Hewins (1990, p. 163) further notes that many user studies rely on capturing the past use of information rather than planned use of information. Finally, Durrance reflects that "overall there is a widespread dissatisfaction with the research methods used and the assumptions made by many researchers" (1989, p. 127).

Similar criticisms have continued to appear in the nineties as well. Froehlich (1994, p. 126) argues that the methodological choices of the system-oriented approach has been found to be unsatisfactory: "On the one hand, Park and others ([for example], Dervin and Nilan, 1986) argue that traditional methodologies, ones simply quantitative in nature, may not be appropriate in studying the dynamic character of information seeking [and information needs], and a lot of the traditional research is flawed due to the artificiality of the information-seeking setting or to the use of inappropriate or inadequate methodologies". Bystrom and Jarvelin (1995, pp. 197-198) comment that structured questionnaires and interviews, observations and diary methods are basically insufficient and produce superficial results, although they might be good to generate quantitative data. Kaniki (1995a) reflects on the criticisms directed at some of the research techniques employed in information needs studies. In introducing his observations on the issue, Kaniki comments that "One issue that keeps recurring in the literature on this subject [information needs and uses studies] is that of techniques for assessing information needs. The major concern has been with the reliability, internal and external validity of methodologies and instruments used or, in lay terms, the utility and suitability of the techniques"(1995a, p. 11). Nicholas maintains that the reasons why the LIS professionals have neglected undertaking users' needs assessments include absence of a universally agreed framework for assessing information needs (1996, p. 2). Nicholas further observes (1996, p. 11) that "It often turns out that studies claiming to be investigating needs are in fact looking at nothing other than use or demand. Citation and library loan studies are frequently guilty here". Nicholas explains his point by arguing that citation and library loan studies can only show what the user has used from what has been made available to him or her. It does not fully show what the needs actually have been. Finally, Devadason and Pratap Lingam (1997, p. 50) observe that the methodology used in most information studies in the past have been inadequate for uncovering the real information needs of users.

Some researchers also emphasize the shortcomings of the quantitative orientation of system- oriented research tradition. According to Rohde (1986, p. 64) "The quantitative approach with its emphasis on numbers and its quest for generalization is seen as



depersonalizing information provision and information use and isolating them from the settings in which they occur". Fidel (1993, pp. 233-234) notes that the shortcomings of quantitative-oriented research have been further recognized by many writers in different areas of LIS and related fields: "Several researchers analyzed the research done in their speciality, pointed to its limitations and problems, and explained how the qualitative approach provides remedies. Wilson (1981) looked at the user studies on IR [information retrieval] research, Fidel (1987) at online searching behaviour, Neuman (1989) at computer-based instruction, Orlikowski and Baroudi (1991) at MIS [management information systems] research, and Sonnenwald (1992a) at research about design" (p.233-234). Wilson (1999, p. 250) contends that the inappropriateness of quantitative methods to be the causes of failures in information needs research: "...in the positivist tradition, quantitative research methods were adopted that were inappropriate to the study of human behaviour: many things were counted, from the number of visits to libraries, to the number of personal subscriptions to journals and the number of items cited in papers. Very little of this counting revealed insights of value for the development of theory or, indeed, of practice". He adds that the qualitative approach has the potential to address the shortcomings observed by him.

One can also add the following broad shortcomings of the system-oriented research methods. Firstly, the questioning approach generally attempts to find out the information needs of users from the users themselves. This approach assumes that the users are in a position to understand and express their information needs at anytime. This approach also assumes that the information needs of users are static and what is uncovered at some point in time is an adequate representation of the need as whole. These assumptions are incompatible with the nature of information needs such as the cognitive and dynamic aspects which are difficult to understand and express by those who are experiencing them. Secondly, observation usually aims at indirectly observing the information needs of users. Observation as a method also assumes that the information needs of users are observable by others in one way or another or can be inferred from the observable information behaviour of users. It also assumes that information needs occur at a given time and place. This approach again is deficient as information needs are neither static or

overtly observable by others. Finally, analysis of records and documentary sources also have similar weaknesses in that they focus on past needs and source of data that could reveal only a partial aspect of the users' past information needs. The analysis also reflects only requested and used information. They, thus, also fail to uncover present and potential information needs of users on which such studies should concentrate.

Some of the writers discussed above and others put forward the qualitative approach as a potential remedy for the shortcomings of the quantitative approach to information needs study (for example, Rohde, 1986; Froehlich, 1994; Wilson, 1997). The qualitative approach will be discussed as a research approach of user-oriented conceptualization later in this chapter.

#### **2.2.2.3.2 Criticisms related to research focuses**

The research focuses of the system-oriented conceptualization have been criticized for their emphasis on observable information behaviour and events as well as for their concentration on information needs at user group level. Subsequent paragraphs discuss these two broad areas of criticisms.

##### **2.2.2.3.2.1 Criticisms against focusing on observable information behaviours**

The criticisms related to focusing on observable information behaviours and events are manifested in criticisms against research that focuses on user demands and researches that focus on systems needs as evidence of information needs of users. In the literature of LIS, information demand is commonly defined as what users ask or request for, whereas information want is defined as what users would like to have, whether or not the want is actually translated into a demand on information systems (Line, 1974, p. 87; Nicholas, 1996, p. 9). Furthermore, the concepts are understood as having a broader dimension than used to define them as above. For example, Brittain (1970, cited in Faibisoff and Ely, 1978, p.271) describes information wants as felt but unexpressed needs for different reasons. The reasons include lack of sufficient and specific details about the need to



translate into a demand. Greene (1990, p.67) describes demand not only as what an individual asks for but also as what the users' use of the established services is. Krikelas also views demand as articulated conscious needs.

However, many writers point out the shortcomings of these concepts to explain the information needs of users. Nicholas (1996) stresses that normally not all that is needed is wanted and not all that is wanted is actually needed. Factors related to personality, time, resources (or physical and personal factors broadly) affect what information is wanted and what is needed. Explaining his points, the author says that "individuals may not be motivated to chase information, may not have the time to look for it, or have the skills to locate information, or may be, just do not have the access to the necessary information resources (through lack of finance, perhaps)" (Nicholas, 1996, p. 9). Similarly, he comments that not all that is demanded is actually needed and not all that is needed and wanted is demanded. For example, because of lack of awareness that the information they need is there, users may not demand it (Nicholas, 1996, p. 9). Greene (1990, p. 67) agrees that need exists whether the user realizes it, wants it or demands it, while a user may want or express demand for information without necessarily needing it. Greene also notes that want can exist in the mind of the user without being translated into a demand on the library service for a wide variety of reasons such as reticence, ignorance, or lack of confidence in the library (1990, p. 67). Greene further acknowledges that it can be more difficult to find evidence of a need than of a want. He explains that "the possession of a want frequently results in patterns of behaviour from which an observer may without difficulty discern the want underlying them. The existence of a need may leave no such easily readable traces, especially if the person concerned is unaware that he or she has the need. This problem may lie at the root of dissatisfaction with the results of much 'user studies' research in library and information science" (1990, p. 67).

Some researchers also argue that these concepts are incomplete representations of the information needs of users on the grounds that they represent only the conscious needs, which leaves out the unconscious needs which are considered to generally exist (Krikelas, 1983, p. 8; Mizzaro, 1998, p.306; Taylor, 1968). Unconscious needs here could



imply both the needs that are not recognized by the user or those that are in the process of being recognized. The conscious need is also viewed as what the user has realized and expressed taking into account all possible constraints in actually receiving potentially relevant information content for use. Taylor's (1968) four points along the need continuum imply that the demand that users express to information systems, which he calls compromised needs, are far removed from the real or actual needs. The four points along the need continuum identified by Taylor are visceral need, which is the actual but inexpressible need for information; conscious need, which is within the brain description of the need; formalized need, which is the formal statement of the need; and the compromised need, the question as it is presented to an information system (Taylor, 1968). According to Taylor, demands which users put across to information systems are conscious needs constrained by the perception of the user, formalized by human language and compromised by the system language. In agreement with Taylor's view, Krikelas observes that "formulation of an expression is influenced by some perception (a perceived idea, perhaps) about the source as much as the nature of the problem". Morris also argues that "because individuals cannot easily express what they don't know or what is missing, questions submitted to information systems based on the individual's request won't adequately represent what is needed" (1994, p. 22).

Mizzaro (1998, p. 306), in the context of IR interaction, also uses four points along the information needs continuum similar to Taylor's and concludes that query, request, perceived information needs and real information needs are obviously quite different. Mizzaro's four points or levels of information needs are: real information needs arising from problem situations; perceived information needs, which are mental representations of the real information needs and which could be a representation of wrongly perceived information needs; the request, which is an expression of the information need in human language; and the query, a representation of the request in a system language (1998, p. 306). According to Mizzaro, the query passes through a number of constraints or barriers which reduces its similarity to the real information needs. He points out that the perception operation from real to perceived information needs is difficult because "the user is in a problematic situation where he has to search something that he does not



know". The expression operation is hindered because a user expresses his needs in terms of labels, or keywords, and not as a complete statement and the formalization process is not simple since the system language might not easily be understandable by users (1998, p. 307). He concludes that there is usually only a partial translation of the real information needs into perceived needs, then into the request and finally into the query (1998, p.307). Therefore, considering user request or query as a representation of the information needs of users is misleading as it gives an incomplete picture of real information needs.

Similarly, Belkin and Vickery (1985, p. 13) note that

Taylor's work is significant in that it postulated that the user engaged in information behaviour only after having recognized some internal, inexpressible but significant psychological state which eventually led to an expressed request or command for information. Thus, what the system got from the user was something which somehow depended upon the user's internal 'visceral' need, but which was so 'compromised' by various translations (internal and external), that extensive negotiation with the librarian was necessary in order even to come close to that original need.

Dervin and Nilan also criticize the focus on demands on the grounds that it has led research to assume that what users express is what they actually need. According to the authors, depending on what users state as being that which they need has been misleading because information needs are usually non-specifiable and continuously changing (1986). Finally Nahl argues that demands and wants are an incomplete representation of the information needs of users and that there is a need for probing into these demands and wants in order to find out the real information needs behind these (1998, p. 331).

From these and other writers, one can see that in general, information needs are broader than both demands and wants and hence substituting information needs by these concepts is misleading. Even if the information needs of users are fully understandable and expressible, these concepts represent less than what the information needs of users are. Thus, the focus on demands of users as indicators of their real information needs has been one area of criticism of the system-oriented research focus.

Criticisms against researches focusing on systems needs is another area where criticisms against the research focus on observable behaviour is manifested. Some researchers criticise focusing on systems needs rather than on what users need (Belkin and Vickery, 1985; Dervin, 1992; Dervin and Nilan, 1986; Palmquist and Kim, 1998; Sugar, 1995). The basic argument against focusing on systems needs is that such focuses do not reveal what users actually lack (Dervin and Nilan, 1986, p. 17; Sugar, 1995, p. 78). Palmquist and Kim (1998, p. 22) note that because of its focus on systems needs, the system-oriented research has done little to address the actual concerns of users. They argue that the system-oriented research should focus on variables that are internal to the user rather than focusing on features of the system. Dervin (1992, p.64) criticizes the systems need focus of the system-oriented conceptualization as follows:

The difficulty is that the data tell us nothing about humans and what is real to them and do not show us how people manage to get utility out of systems which systems do not even predict, or how what looks like a failure from the systems perspective is actually a success when seen from the human's eye. The data do not help us understand why a service people said they wanted goes unused, or why as communication technologies spread we appear to be creating a more demarcated world of communication haves and have-nots. The data do not tell us where we might move our systems if we are really to serve people on their terms.

Dervin and Nilan (1986) observe that the focus on systems needs has led to ignorance of what users need. They also point out that this focus has led to researchers dealing with what they believe is information needs and not what users consider they need. What users need outside of the existing system is ignored in the systems needs focus. Belkin and Vickery (1985, p. 8) observe that the focus on system needs “does not address the question of whether the services which the system provides are actually the services which the potential users ‘need’”.

#### **2.2.2.3.2.2 Criticisms against focusing on user group level within the system-oriented conceptualization**

Some of the criticisms of system-oriented research focuses are directed at its focus on user group characteristics as a basis to determine the information needs of users (Belkin



and Vickery, 1985; Dervin and Nilan, 1986; Hewins, 1990; Palmquist and Kim, 1998; Rohde, 1986; Westbrook, 1997a). The basic argument against attempting to determine the information needs of users on the basis of the characteristics of the groups to which users belong to or users demographic variables is that information needs of users are influenced more by personal factors and individual situations that each user passes through in relation to the use of an information system (Belkin and Vickery, 1985, p. 16; Rohde, 1986, p. 65). Rohde points out that demographic variables provide little insight into the information needs of users (1986, p. 56). Rohde adds that it is the nondemographic variables, such as personal, work environment, and task attributes, that provide more information about users' information behaviour. Westbrook (1997a, p. 317) observes that "Assumptions about people based on stereotypes of race, class, sex, and so on are increasingly recognized as major barriers to service in that they prevent librarians from actively listening to every expression of need". The use of demographic variables to predict information needs assumes that information needs are static, irrespective of everyday situations that users experience. Hewins (1990, p. 165) also opposes the focus on user groups, such as social scientists or managers, as a basis to determine the information needs of users by emphasizing that information needs are recognized to occur cognitively and these cognitively based characteristics of information needs have to be taken into account in order to develop information systems that adapt to the information needs of each user. Hewins stresses that research on the individual user's behaviour should drive research on information system and that the characteristics of the individual user should take precedence if we want to design effective information systems. As will be shown later in this chapter, proponents of the user-oriented conceptualization also indirectly criticise the focus on the group needs by arguing that information needs are cognitive and subjective.

In concluding the criticism section of the system-oriented conceptualization, we can summarize that although the use of the system-oriented approaches is still dominant, the dissatisfaction and rejections of them as being inadequate for determining the information needs of users have been voiced from different corners and for a long time now.

#### **2.2.2.4 Summary of the system-oriented conceptualization**

The system-oriented conceptualization of information needs is one of the underlying conceptualizations guiding information needs research. System-oriented conceptualization assumes that information needs are observable and measurable. It also assumes that information needs are static and independent of the setting they occur in. The research in system-oriented conceptualization focuses on the observable dimensions of information behaviour and events. It also focuses on studying the information needs of users at a group level. The research approaches employed are predominantly direct questioning of users about what they need from existing information systems and observing their contact with information systems as evidence of information needs. In other words the assumption is that needs can be extrapolated from the use or non-use made of an information system. It is also quantitatively oriented in its data collection and analysis.

However, both the research focuses and methodological approaches have attracted criticisms from some researchers in the field. While the research focuses are criticized as inappropriate to look at information needs, the methodological approaches are viewed as inapplicable to unravel the real information needs of users. This is believed to have contributed to the overall dissatisfaction within information needs research. In response to the dissatisfaction with the system-oriented approach to information needs, some have adopted a user-oriented conceptualization. The user-oriented conceptualization is discussed below.

#### **2.2.3 User-oriented conceptualization of the information needs of users**

As indicated earlier, research results based on the system-oriented conceptualization have been criticized by many researchers. In reaction to this dissatisfaction some researchers have put forward a conceptualization that challenges and moves away from that of the system-oriented. The conceptualization came to prominence in the eighties (Westbrook, 1997a; Wilson, 1994) largely in the form of what is known as the user-oriented view. It is



also referred to as the user-centered, or the emerging view, or the alternative view. In the user-oriented conceptualization, information needs are assumed to be situational, subjective, cognitive, dynamic and non user-specifiable (Allen, 1996; Barry, 1994; Belkin and Vickery, 1985; Brittain, 1982; Cole, 1998, 1999; Dervin and Nilan, 1986; Downs and Friedman, 1999; Durrance, 1989; Hewins, 1990; Ingwersen, 1995, 1996, 2000; Ingwersen and Willett, 1995; Itoga, 1992; Kennedy, Cole and Carter, 1997; Kuhlthau, 1991, 1998; Morris, 1994; Nahl, 1998; Nicholas, 1996; Palmquist and Kim, 1998; Rohde, 1986; Savolainen, 1993; Schamber, Eisenberg and Nilan, 1990; Sugar, 1995; Tang and Solomon, 1998; Vickery, 1997; Westbrook, 1997a; Wilson, 1997, 1999, 2000). The paragraphs below highlight each of these assumptions about information needs in the user-oriented conceptualization.

Information needs are assumed to be situational in the user-oriented conceptualization. By situational is meant that information needs arise from specific situations that users find themselves in and these need change as situations change. The specific situations that users find themselves in give rise to what information they require in order to make sense of the situations. The situationality of information needs also implies that they occur beyond the context of the user-system interaction. Each situation or activity that users encounter leads to specific information requirements for its understanding and execution. Dervin and Nilan (1986, p. 14) argue that users construct information needs out of situations they find themselves in. Hewins notes that "The user's need is situational and changes as the situation changes". Dervin views gaps or information needs as arising out of specific situations in time and space (1992). According to Sugar what information is needed and the interaction between information and the user depends on the particular situation in which the user finds himself (1995, p. 90). Sugar further makes reference to findings where it is shown that situational approaches do a better job of predicting information needs and provide useful information to inform system design (1995, p. 91). Allen (1996, p.63) notes that the interactions between life situations and users' knowledge structures give rise to information needs of users. A similar view is forwarded by Ingwersen who states that "The development of a desire for information is a result of communication, sensing or thinking processes. The outcome of such



phenomena is a situation which makes a person's cognitive state process the circumstance in such a way that it recognizes a current 'incompleteness or inadequacy'" (1996, p. 14). For Wilson, information needs arise out of situations which include "the role demands of the person's work or life, or environments (political, economic, technological, etc.) within which that life or work takes place" (Wilson, 2000, p. 52). Some proponents of the user-oriented conceptualization also call for repetitive information needs studies on the premise that information needs arise from situations that users encounter on a continuous basis and these needs change as situations change (Dervin and Nilan, 1986, p. 14). Situation here refers to the particular set of circumstances from which a need for information arises (McCreadie and Rice, 1999, p. 59). Situations could be tasks, interests or problem situations (Kennedy, Cole and Carter, 1997, p. 562). Situations could also relate to work, family, friends, entertainment (Chen and Hernon, 1982).

Information needs are also considered to be cognitive in nature in the user-oriented conceptualization. By cognitive is meant that information needs stem from what a person knows or thinks (Allen, 1996; Palmquist and Kim 1998). It also means that information needs occur in the minds of the users. Information needs occur in the mind because they are the difference between what a person knows or thinks about situations encountered and what it takes to understand and deal with the situations. According to this assumption, as individuals pass through life situations, they consult their knowledge structures in order to interpret the situation and select a course of action. Information needs occur when individuals' existing knowledge fails to provide a clear understanding of the situation encountered (Allen, 1996, p. 62). New situations may lead to failure in the existing knowledge structures of individuals as what is needed to interpret and understand the new situations does not exist in the knowledge structures. The perceptions of a gap in knowledge occurs in the minds of the users. Knowledge structures refer here to what an individual knows about a particular topic or to the level of an individual's expertise or know-how in a particular process (Allen, 1996, p. 58). It derives from the individual's background and past experiences (Allen, 1997, p. 79; Vickery, 1997, p. 472). The knowledge structures of each individual are unique and contextualized.



A number of writers have supported the idea that information needs are cognitive in different ways. Belkin, Oddy and Brooks (1982, p. 62) note that information needs develop from a recognized anomaly in the user's state of knowledge concerning some topic or situation. Krikelas (1983, p. 9) makes a similar observation that "... Inquiry into the whole area of deferred need is difficult because such study must deal with a complex and mentally internalized process...". Kuhlthau (1991, p. 362) states that "The gap between the user's knowledge about the problem or topic and what the user needs to know to solve the problem is the information need". Allen points out that information needs come into existence when an individual's existing knowledge structures fail to provide an appropriate course of behaviour for that individual to make sense of his/her life situation (1996, p.60). Vickery states that the desire for information arises from an awareness of a lack of personal knowledge in relation to some problem situation or current interest (1997, p. 472). Westbrook (1997a, p. 319) observes that people making requests do so from their own situations, with their own world view and their own internal knowledge structures. According to Ingwersen (1995), a "state of uncertainty" which signifies the individual's current lack of information, hence the desire for information, occurs when the actual "state of knowledge" of a person is not capable of solving a problem or fulfilling a goal by his or her own thinking. The state of knowledge refers to the current cognitive and emotional state of the individual. The desire for information includes "the identification and formulations of the problem or interest, as well as how to obtain adequate information and from where" (Ingwersen, 1995, p.161). A similar view to Ingwersen above is also reflected by Kuhlthau who points out that uncertainty, that is, information needs, initiates information seeking (1998, p. 356). Kuhlthau defines the state of uncertainty as "a state of doubt in which the individual's own state of knowledge, work space and cognition cannot fill the problem space by thinking, causing interaction with the world around it to obtain supplementary information, [for example], by accessing an information retrieval system" (1998, p. 359, citing Ingwersen, 1982).

Dervin's gap in the sense-making model refers to a cognitive gap or a gap in knowledge that users experience when they face unknown situations (Dervin, 1992). The assumption

that information needs are cognitive implies that they are not observable by others. This is in contrast to the system-oriented conceptualization where information needs are treated as observable and measurable.

Closely related to the cognitive view above, information needs are also conceptualized as being subjective. The subjective assumption treats information needs as being an experience that only the person who is experiencing can know. Only the person who is experiencing information needs knows whether he has them as well as what his information needs are ultimately. The subjective assumption also points out that information needs are those as perceived and viewed by each individual (Dervin, 1992). It also means that because of the uniqueness of the state of knowledge of each individual, what each user needs for dealing with his environments is unique. In connection with this assumption, Rohde reflects that information needs are seen as subjective, relative concepts existing only in the mind of the experiencing individual (1986, p. 53). Nicholas (1996, p. 12) states that "Information needs are highly personal, varying even amongst those doing the same work in the same organization". Wilson (1997, p. 552) observes that information need is "a subjective experience that occurs only in the mind of the person in need and, consequently, is not directly accessible to an observer". Similarly Morris states that information need is knowable only to the person who has it (1994, p. 28). Westbrook (1997a, p. 317) reflects that users are highly individualized people whose needs evolve within the ever-changing context of personal knowledge and life experiences. Hewins also argues that frequently only the user can determine the individual nature of the situation that gives rise to information needs (1990, p. 165). This leads to each individual ending up with unique needs depending on that individual's understanding of the situations.

The assumption that information needs arise when individuals' knowledge structures fail to provide clear interpretations of problem situations or to provide appropriate courses of action also implies that information needs are subjective. What one needs is what one lacks in one's knowledge structures, which will be unique to each individual. This is the case because no two persons will have identical knowledge structures. Allen (1997, p.



113) comments that “The basic idea in the cognitive perspective is that two people will experience different information needs in identical situations because they have different understandings of these situations. Their understandings will be different because their knowledge structures derive from different past experiences”.

Information needs are also viewed as being dynamic by the user-oriented conceptualization. By dynamic it means that information needs evolve from being vague to clear as a result of the interaction between the user and potentially relevant information sources. According to this assumption the information needs of users change in the course of information seeking by users, where every interaction with potential information sources adds to the better understanding of one’s information needs. Barry (1994) generalizes that information needs are dynamic and constantly changing. Barry points out that it is widely recognized that users’ information needs are “typically dynamic and fluid state which will be updated and revised as new information is received”(1994, p. 149). Harter (1992, p. 610) states that “one’s ASK [anomalous state of knowledge] is modified the first time a relevant citation is encountered. Henceforth it is something different”. Tang and Solomon (1998, p. 241) observe that people’s perceptions of what constitutes the information they need might be modified during the evaluation process of search results and add that the interaction with bibliographic items could result in a change in understanding regarding the topic being searched. Downs and Friedman (1999, p. 284) also share their observation of the continuously changing nature of information needs as follows: “often, scholars’ information needs changed as a consequence of insight gained or from serendipitous discovery. After perusing the retrieved items, scholars either composed new queries or revised existing queries to communicate their evolving information needs to the intermediary”.

In the context of IR interaction particularly, Cole (1998, p. 715) also points out that information needs become manifested to users while interacting with IR systems. Similarly, Ingwersen states that “Research on user-centered approaches to IR, has led to the observation that individually perceived information needs may change regularly during the course of interaction with an IR system...”(2000, p. 206). Other researchers

have also reported the dynamic nature of information needs of users particularly in the context of IR interaction (Cole, 1999, p. 546; Oakes and Taylor, 2001, p. 226; Pettigrew, Durrance and Vakkari, 2001, p. 345; Wilson, 1999, p. 267).

Information needs are also assumed to be dynamic in the sense that they keep on changing, where one need is replaced by another or one need leads to another throughout one's life. Westbrook points out that acquiring knowledge from potential sources may spark new information needs "so that both the user's state of knowledge and state of need are dynamic rather than static" (1997a, p. 324). Westbrook further adds that "the lack of specificity in the need is both cyclical and developmental, as every new piece of information may change the user's frame of reference. Knowing more about the need Y may provoke an ASK about need X" (1997a, p. 331). Kuhlthau (1998, p. 360) points out that raising questions that lead to seeking for information is a continuous process in one's life. Nicholas' (1996, p. 35) view that research into information needs has to be conducted on a regular basis, implies that there is a need to know current information needs of users that constantly supplant past ones.

Finally, information needs are regarded as usually non-specifiable by users in the user-oriented conceptualization. This means that users usually find it difficult to grasp and articulate their information needs. This assumption argues that a person in need of information is someone who is just aware that his current knowledge is not enough to deal with the situation at hand; aware that his picture of the world is incomplete and inadequate. The concept of a gap in knowledge, which signifies information needs generally, means to many scholars that a user in need realizes that something is lacking in order to move forward in time and space. What is missing is not always known. Thus, users in need of information start with something unknown to them. In relation to this, Belkin, Oddy and Brooks (1982, p. 63) comment that "There are certainly occasions when one might be able to specify precisely what information is required to bring the state of knowledge to a structure adequate for the resolution of the problem, but it seems obvious that the more usual situation will be that in which what is appropriate for the purpose is not known in advance". They add that users' expressions of information needs



are in general statements of what users do not know and that users are unable to express information need in terms of the need itself. Morris stresses that when an information need is ambiguous, it is also difficult to communicate this (1994, p. 25). Morris adds that "often the only way users can articulate what they need is after they see it; that is, they can recognize something that satisfies an information need even though they don't know what to ask for ... (1994, p. 25). Westbrook (1997a, p. 331) argues that "Some initial gathering of information may be needed to give the user what is required to make even a general, internal expression of the anomaly viable". Ingwersen notes that information needs may be ill-defined owing to a lack of appropriate background knowledge (2000, p. 206). Large, Tedd and Hartley (1999, p. 32) generalize that users have difficulties in precisely understanding, identifying and formulating their information needs. The authors argue that neither the problems nor the information needed to solve the problems are clearly understood by users. Other writers have also pointed out that in general, information needs are difficult to specify and articulate by users (Allen, 1996, p. 87; Itoga, 1992; Cole, 1999, p. 546; Harter, 1992, p. 607; Savolainen, 1993, p. 17).

Similar observations have been made about the difficulty of identifying and expressing needs by users who have already approached IR systems. According to Belkin, Oddy and Brooks (1982, p. 66) people who use IR systems are typically unable to specify and articulate precisely what information they need since it is precisely the lack of that knowledge which has brought them to the system. Agreeing with Belkin, Oddy and Brooks (1982), Cole (1998, p. 715) indicates that "a person's information need is not known by the person seeking the information, and therefore cannot be directly expressed by the person in a query to an information retrieval (IR) system". Rieh (1999, p. 181) notes that "In human-human interactions it is also difficult to understand what users actually need because many users cannot specify their information problems sufficiently. This is because, as Robert S. Taylor noted, 'one person tries to describe for another person not something he [or she] knows, but rather something he [or she] does not know'". Similarly, Nicholas argues that "More often vague subject specification mirrors the users own confusion and uncertainty as to what they want: it is difficult for them to verbalise their own problem, although they will recognise what they want when they see

it. After all, users are asking for information to fill a gap in their own knowledge: plainly, this must inevitably lead to some imprecision in the formulation of the query” (1996, p. 16). Furthermore, Belkin, Oddy and Brooks (1982), Schamber, Eisenberg and Nilan (1990) and Cole (1998) have stressed the importance of emphasizing users’ difficulty in understanding fully and articulating immediately their needs when developing information systems and services .

Some writers particularly emphasize the difficulty users have in expressing their information needs. Schamber, Eisenberg and Nilan (1990, p. 768) see information needs as involving the user’s perception of a gap or anomaly in his/her knowledge base that he/she may not be able to express adequately to an information retrieval (IR) system. Reneker (1993, p. 493) also states that “Earlier studies, such as Chen and Hernon’s, revealed the difficulty respondents experienced in articulating information needs”. Even when some understanding of what information is needed is there, according to many, users commonly find it difficult to describe it. Westbrook describes such situations thus (1997a, p. 330): “Perhaps the most apt analogy for an information need may be a hologram that the user walks around and through but may have difficulty verbalizing”.

In short, the user-oriented approach conceptualizes information needs as being:

- Cognitive as opposed to observable and measurable in the system-oriented approach
- Subjective and difficult to understand and articulate as opposed to shareable in the system-oriented approach
- Situational and dynamic as opposed to static and stable in the system-oriented approach

User-oriented conceptualization has its own assumptions regarding information and information users. The user is considered as a unique, active participant, and central in the development and meeting of information needs (Dervin and Nilan, 1986, p. 16; Fidel, 1993, p. 234; Palmquist and Kim, 1998, p. 9; Sugar, 1995, p. 78; Westbrook 1997a, p. 316). The user is understood as constructing information needs from situations that



he/she encounters. The user is the one that defines what he/she needs and bridges the needs using his/her own strategies and tactics. The user is treated as the creator of information from whatever he/she finds informing. In this connection, Horne (1983, p. 5) points out that the information user is a constantly active person that searches, filters, selectively acts on, reorganizes, and creates information. Dervin and Nilan (1986, p. 14) describe the user as in a constant state of constructing information needs out of situations and meanings or senses out of sources and services provided. Rohde observes that users are recognized as having internal information stores which they use to make sense of external information and of the situations in which they find themselves at any given time (1986, p. 52). Morris notes that according to the user-oriented view the user is at the center of an active, ongoing process of perception of information (1994, p. 22). Westbrook (1997a, p. 316) reflects a similar view in that the user in the user-oriented conceptualization is in a constant state of actively constructing information needs and meaning from the situations he/she passes through. Westbrook states that "According to the theoretical stance of current user needs research, the individual is a central, active participant in the information-seeking experience (ISE) rather than a passive recipient of an information product. The ISE involves actions, motivations, and decisions that are under the strong influence, even absolute control, of the user" (1997a, p. 316).

In user-oriented conceptualization, the user is also treated as the focal point of system design and evaluation. According to Fidel "A user-centered approach... implies that information-related phenomena are studied from the user's perspective and that system design and evaluation are centered on the user, not on the system. This means that each user is unique, operating within a certain context and affected by situational conditions" (1993, p.234). Hewins (1990, p. 146) also notes that users are central and dictate the design of information-provision mechanisms in the emerging view: "Past assumptions place the user in the passive position of having to adapt to the information-provision mechanisms rather than the mechanism's adapting to the user's particular characteristics. The success of the user's search was measured according to the traditional measures, such as recall and precision, rather than according to the resolution of the user's problem". The user is thus actively constructing information needs and meanings as



opposed to being the passive receptacle of information in the system-oriented conceptualization. As pointed out earlier, however, it is commonly argued that although each user is unique treating users as a group for convenience of addressing their needs is a practical necessity.

Information in the user-oriented conceptualization is assumed to be subjective, situational, and cognitive (Dervin and Nilan, 1986, p. 13; Morris, 1994, p. 22; Nahl, 1998, p. 330; Palmquist and Kim, 1998; Schamber, Eisenberg and Nilan, 1990, p. 769; Sugar, 1995, p. 78; Rohde, 1986; Westbrook, 1997a, p. 319). According to user-oriented conceptualization, information is subjective in that it is the sense constructed by each individual at a specific time and place. Information is whatever is informing to each individual and does not exist outside of the human experience. What is useful information for one user may not be so to another even if both users are dealing with the same situation. The meaning and utility of a given information content varies from person to person depending on what each user already has in his knowledge store. Westbrook (1997a, p. 319) reflects on the subjectivity of information as follows: "If the goal is to meet the user's need, rather than match a request with a citation, then the user's subjective and uniquely personal view of information becomes paramount...What is information to one could be incomprehensible nonsense to another. Taking today's generally accepted view that information is that which modifies a user's internal knowledge structure, then information is inherently subjective". Sugar (1995, p. 89) argues that users receive information via a subjective perspective. Savolainen notes, based on the works of Dervin, that information is "the sense created at a specific moment in time-space by one or more humans. Information is not seen as something that exists apart from human behavioural activity. All information is subjective; it is a personal construction created by human observers..." (1993, p. 18). Similarly, Nahl (1998, p. 330) states that in user-oriented research "information is the sense that is created at a specific moment by an individual. Information does not exist apart from the subjective, constructive process". Palmquist and Kim (1998) agree with the reviews of Dervin and Nilan (1986) that user-oriented studies are concerned with the more subjective values of information- the values that are perceived by the user. Information is thus considered to



be something constructed by the users themselves (Dervin and Nilan, 1986, p. 16).

According to the user-oriented conceptualization, information is cognitive in that it is constructed in the mind of the individual where the knowledge structures reside. Information is what the individual perceives and finds informing. To perceive information, the individual uses his/her existing store of knowledge in the mind. Only that part of the information content which helps the user resolve the gap in knowledge is what is considered information for the individual. In relation to this assumption, Rohde (1986, p. 62) reflects that information is “essentially internal, a part of an individual frame of reference, rather than an object which exists externally... It is the individual who makes sense of the information, constructs reality, and decides the utility of information in a given situation”. Dervin and Nilan (1986, p. 17) also conclude that proponents of the user-oriented conceptualization consistently define information as a stimulus that changes the cognitive structure of the receiver. Finally, Schamber, Eisenberg and Nilan (1990, p. 769) observe that “From the alternative perspective [user-oriented], meaning for the individual is seen as internally constructed, based on existing knowledge, values, goals and expectations as well as on perceptions of external reality”.

Information is also assumed situational in that what makes sense under one situation may not be relevant in another situation for the same person. The information needed and used by each individual is determined by its appropriateness in understanding and handling each situation. According to Nahl (1998, p. 330) the view that information is a sense that is created at a specific moment by users reflects the users’ interpretation of a situations. Information is a creation of users in their effort to make sense of new or problematic situations. Thus, the nature of information is influenced by individual situations that lead to its creation.

Therefore, information in user-oriented conceptualization is treated as subjective, situational, and cognitive which is different from that system-oriented conceptualization that views information as objective and as existing outside of human perception.

### **2.2.3.1 Research focuses in the user- oriented conceptualization**

In accordance with its conceptualization of information needs and related concepts, the research in user-oriented conceptualization focuses on the user, the situation in which information needs take place and the whole process of information needs development and satisfaction (Allen, 1996; Belkin, 1990; Belkin and Vickery, 1985; Bruce, 1997; Dervin, 1992; Dervin and Nilan, 1986; Hewins, 1990; Ingwersen, 1992; Morris, 1994; Schamber, Eisenberg and Nilan, 1990; Taylor, 1991; Vakkari, 1994; Westbrook, 1997a; Wilson, 1984).

The user-oriented conceptualization primarily focuses on the user in order to understand information needs. It focuses on users' internal behaviours, such as how people perceive and define, as well as users' external behaviours, such as how people go about meeting their needs, to explain the development and satisfaction of information needs.

Consequently, the user-oriented research asks such questions as what people think and do when they engage in information behaviour, how people define needs in different situations, how they present these needs to systems, and how they make use of what systems offer them (Bruce, 1997, p. 323; Dervin and Nilan, 1986, p. 16). After reviewing the literature between 1986 and 1990 on information needs and uses, Hewins points out that "A review of information need and use studies in library and information science literature reveals that the focus of research has indeed shifted to the user and to user behaviour, although many studies still continue to examine users in terms of the system they use or the groups to which they belong" (1990, p. 154). Westbrook (1997a, p.321) observes that "Gradually studies incorporated efforts to uncover the internal elements of ISEs in any setting. The personal information systems, cultural contexts, and knowledge structures of users became part of the research question. The scope of user studies moved into crucial but less observable issues such as decision making, the research process, and using information ...".

The main focus of the research on internal behaviour of users is their cognitive aspects. The research focuses on individuals' cognitive aspects that could explain the nature of or



that could help to understand the development and satisfaction of information needs. It studies how cognitive aspects give rise to information needs and how they influence satisfaction of the felt needs. It specifically calls for focusing on knowledge structures and cognitive processes of users in order to analyse information needs of users (Allen, 1996; Bruce, 1997; Hewins, 1990; Ingwersen, 1992; Westbrook, 1997a; Wilson, 1984). Allen points out that the cognitive studies in information needs emphasize the role of knowledge structures and cognitive processes in defining and meeting information needs (1996, p. 58). According to Ingwersen, cognitive viewpoint stresses the role of the actual state of knowledge of users in processing information (1992, p. 122). Bruce (1997, p. 323) states that the user-oriented approach focuses on what people think as well as what they do when they engage in information behaviour in the belief that what is going on inside a person's mind will shape the way information is interpreted. Hewins (1990, p.165) points out that the cognitive approach acknowledges that information needs occur cognitively and as a result it focuses on investigating the cognitive processes that influence the information needs of individuals. Wilson (1994, p. 30) generalizes that the user-oriented conceptualization approaches the problem of information needs and use from a cognitive perspective where it focuses on what users feel and think.

As mentioned above, user-oriented conceptualization calls for focusing on knowledge structures and cognitive processes. Knowledge structures are of interest to researchers in user-oriented conceptualization because they are viewed as being involved in determining how users perceive their problem situations. They are also viewed as determining the nature of information content that needs to be acquired since what is lacking in the knowledge structures is what should be acquired. The cognitive focus approaches information needs as a cognitive gap or gap in knowledge. As stated earlier, knowledge structures refer to what people know and think about problem situations.

Cognitive processes are of research interest, too, on the grounds that they influence how information needs are defined by users as well as the use made of potential information sources acquired by users. Cognitive processes include thinking, learning, remembering, comprehending, interpreting, imagining, and problem solving (Allen, 1991, p.13). Within

the cognitive processes, cognitive styles are one of the major areas of interest to user-oriented research. Cognitive styles refer to relatively stable preferences in the ways people think, learn and solve problems (Allen, 1991, p. 21). Cognitive styles influence the manner in which individuals prefer to learn and to seek and retrieve information. How users assimilate and process information in constructing information, information needs, and meanings depend on the thinking, learning and problem solving styles of each individual. Consequently the cognitive processes influence the nature of information content that resolves the knowledge gap for each individual. This is so because information presented in a way that suits the individual cognitive styles can easily be absorbed to fill the felt gap. For example, a series of researches on learning styles in the electronic information environment at Sheffield University shows that learning is disrupted when information is presented in ways which mismatches students' preferred learning styles (Ford and Wood, 1994). The researches further show that the rate, quality and durability of learning is dependent upon whether or not the teaching strategy is of a sort that suits the individual (Ford and Wood, 1994). In these researches different tests are used to determine the learning styles of students, namely, Short Inventory of Approaches to Studying (standardized test) and Study Preference Questionnaire (non-standardized test). In other words, how users define their knowledge gaps and bridge these gaps are also dependent on their thinking, learning, and problem solving abilities and styles. In this regard, Westbrook indicates that "Users assimilate or make sense of information they encounter in different ways, depending on such factors as their learning styles, cognitive functions, and affective responses..." (1997a, p. 323). The author adds that "Modelling, experience, graphic representation, and written instructions fold uniquely into each person's knowledge structure because individuals' learning styles are quite different" (1997a, p. 326). Thus, the cognitive focuses of the user-oriented research seeks to explain information needs behaviour by reference to what people know and think (that is, knowledge structures) as well as to how people learn and remember (that is, cognitive processes).

The user-oriented research also studies the user from the user's perspective (Dervin, 1992; Dervin and Nilan, 1986; Sugar, 1995). What users perceive as a gap in knowledge



is viewed as what needs to be known according to user-oriented research. It is argued that because constructing information needs out of situations and meanings from information are subjective and individual, it should be from the users' perspective that information needs should be looked at. It is important to know how the user defines his/her gaps and what information he/she expects to fill the felt gap. Furthermore, the user-oriented research sees the system from the perspective of the user. It sees the system only as seen by the users.

The other research focus of the user-oriented conceptualization is on the situation from which information needs stem. As mentioned earlier, situations are specific circumstances that are responsible for the development of information needs in users. Different justifications have been forwarded in support of focusing on situations. To start with, situations are studied because of the view that resolving problem situations that give rise to information needs is the reason why information is needed (Belkin and Vickery, 1985). The view argues that enabling users to address problem situations is what is meant by meeting user needs. Thus, by knowing the situations it is believed that it would be possible to identify what information is needed. Implied in this view is that the appropriateness of information acquired is dependent on the situations that give rise to the need in the first place. In other words, situations are considered critical because the value of information depends on what it does to help users understand and deal with the situations that give rise to information needs. Taylor (1991, p. 218) argues that what makes given information useful is the specific situation from which the information need arises. This makes studying the situations a necessity in order to determine what information is needed.

Some scholars also believe that focusing on situations that lead to information needs gives clues to the real nature of information (Belkin and Vickery, 1985; Dervin 1992; Gorman and Clayton, 1997; Savolainen, 1993). Belkin and Vickery observe that "There are factors outside the information system which need to be studied in order to interpret information behaviour, and that these factors have to do with the person's social situation, with the problems which the person faces, and with the uses to which the

person intends to put any information gained through the information-seeking behaviour” (1985, p. 13). According to Dervin, situations are important because it is how users see situations as gaps that constitute information needs (Dervin, 1992, p. 66; Dervin and Nilan, 1986, p. 21). Savolainen (1993, p. 17) also reflects a similar view in that how users feel about the problem situations and how they interpret them as gaps are critical in understanding the information needs of users. According to Savolainen, the important questions about cognitive gaps that users raise start with the situations as perceived by the users (1993, p. 17). Gorman and Clayton (1997) argue that taking into account the events that lead to human behaviour provides more insight to the attitudes and meanings that humans attach to the events. Gorman and Clayton state that “Knowing the time and the place in which events occurred and words were exchanged can help inform the content of what was said, adding a richness and depth not otherwise available” (1997, p. 24).

Similarly, some researchers also argue that because information needs are dynamic and difficult to understand and articulate, situations from where the needs arise could shed light on the nature of information needs of users (Belkin, Oddy and Brooks, 1982). Because of the assumption that users have difficulty in identifying and expressing their needs, Belkin, Oddy and Brooks (1982) focus on users’ description of how the gap in knowledge developed, which in essence is the description of the situation that gives rise to information needs. Many more researchers support the importance of focusing on situations in order to learn about the information needs of users (Morris, 1994, p.23; Westbrook, 1997a, p. 324).

User-oriented research also calls for focusing on the whole process of information needs development and satisfaction. The call for focusing on the process of information development and satisfaction is based on the belief that important indicators that need to be known about information needs of users are found scattered from the development to the satisfaction of information needs. According to Morris, proponents of the user-oriented conceptualization believe that “information needs can be addressed by understanding the process that each individual goes through in experiencing a gap, in



trying to resolve it, and in gaining something (especially new knowledge) from the experience” (1994, p. 22). Dervin (1992) argues that the best way of understanding phenomena like information behaviour is by studying the whole process of its development and meeting. Dervin (1992) adds that the ways in which people see their knowledge gaps will be related to the ways in which they try to bridge them. Accordingly, the sense-making model developed by Dervin indicates that what needs to be known in order to determine information needs of users includes the specific situation that gives rise to the information need, how that situation has been perceived, how the user goes about meeting the need, and whether the need is met. To find out this the sense making methodology asks questions revolving around the following issues “How does one feel the situation with its constraints, how does one interpret the situation as gap, what alternative answers (bridges) were invented to move a step forward, how does one move tactically to bridge the gap, and how does one proceed in the journey after crossing the bridge” (Savolainen, 1993, p. 17). Dervin and Nilan (1986) state that focusing on information needs only in the context of information systems is like looking at a still picture where only a glimpse of a moment is caught. They suggest that information needs studies should focus on factors that lead to users’ encounters with information systems as well as on the consequences of such encounters (Dervin and Nilan, 1986, p. 14). Bruce (1997, p. 323) also observes that research in user-oriented focuses on the whole process of information needs, from the time the need arises to when it no longer exists. Finally, Westbrook (1997a, p. 317) points out that the user-oriented conceptualization aims at understanding motivation, cognitive processes, and behaviours throughout an ongoing process.

Writers who argue for the inclusion in research of situations that give rise to information needs and the use made of the information acquired in information needs research can be considered as supporting the basic arguments of the process approach to the study of information needs of users. While study of situations focuses on what happens before information gaps or anomalies are recognized, the process approach includes what happen both before and after the information needs occurrence.

In short, the research focuses of the user-oriented conceptualization emphasize the user as a point of departure in studying the information needs of users. User-oriented researches further focus on what happens before the information needs of users occur and what happens once users acquire information to fulfill their information needs. It is argued that the study of the whole process of information needs development and satisfaction reveals more about the nature of information needs.

#### **2.2.3.2 Research approaches in the user-oriented conceptualization**

The core research methodological approach that has emerged in association with the user-oriented conceptualization of information needs of users is the qualitative research approach (Belkin and Vickery 1985; Dervin and Nilan, 1986; Westbrook, 1997a; Wilson, 1994, 2000). Wilson points out that “Since the 1980s there has been a shift towards a ‘person-centered’ approach, rather than a ‘system-centered’ approach. This has been accompanied by a switch from quantitative methods to qualitative” (Wilson, 2000, p.51).

The characteristic features of qualitative research that make it suitable to the research focuses of the user-oriented conceptualization of information needs include

- Qualitative research focuses on users’ behaviour from their perspective. It seeks to understand what people believe, how they feel, and how they interpret events. Qualitative research assumes that the meanings of events, occurrences and interactions can be understood only from the perspective of actual participants (Fidel, 1993; Gorman and Clayton, 1997; Mellon, 1990; Reneker, 1993; Sutton, 1993; Westbrook, 1997b; Wilson, 1994). Consequently, it aims at eliciting what people actually say and do. According to Fidel (1993, p. 222) the qualitative approach offers the best methods for exploring human behaviour and it does so by understanding people from their own point of view. Reneker (1993, p.490) observes that a qualitative methodology aims at eliciting people’s own written or spoken words regarding their behaviour. Mellon (1990, p. 20) maintains that a naturalistic approach allows an exploration of human situations, settings, attitudes, and emotions that are impossible to study using rigidly defined



statistical methods. The naturalistic approach is another name for the qualitative approach. According to Gorman and Clayton "Putting context and process together allows one to have a grasp of the 'natural history' of events, which is why this approach [qualitative approach] is often referred to as 'naturalistic enquiry' (1997, p. 25). Similarly, Wilson notes that "The move to qualitative methods was a natural one, as the person-centered approach required more in-depth information on people's behaviour that could not be provided by mail surveys. Investigators were seeking understanding of processes and behaviour, rather than description of system use"(Wilson, 1994, p. 35). Sutton (1993) states that qualitative research aims to achieve the understanding of not just the outermost observable characteristics of an action but also the inner motivation of the actor from the actor's perspectives (p. 421).

- Qualitative research focuses on the contexts in which events, processes and behaviours occur. Data is collected from the natural settings in which events are taking place. Qualitative research attempts to gain insight and understanding of human behaviour by "studying real-life situations as they unfold naturally" or by "elicitation of respondents' thoughts and opinions about the investigated questions" in their natural setting and when behaviour is experienced (Fidel, 1993, p. 222). For Palmquist and Kim (1998, p. 17) the qualitative approach in LIS research is that which focuses on collecting "naturally occurring data - that is, data that arise from a natural context and environment"; and continuing they state that "In user studies, this has come to mean going to environments where users experience need for information rather than studying the behaviour of users only within an existing information system environment". Westbrook comments that "Rather than putting users in laboratory settings with artificial databases and questions, [qualitative] researchers are interviewing and observing people in reference to the real life issues they encounter during their ISEs [information seeking experiences]..." (1997a, p. 317). Glazier (1992, p. 7) points out that qualitative research includes contextual data along with the actual research data which increases the richness of the data that qualitative researches yield: "along with the data collected, one also gets a description of what activities

were going around the phenomenon in terms of time and social circumstances surrounding it". In agreement with the above writers, Gorman and Clayton (1997, p. 24) state that knowing the context in which events occur increases the richness and depth of the data collected in qualitative researches.

- Qualitative research focuses on the process of events under study: Qualitative research is concerned with understanding the process of events and the various components of the process. Qualitative research aims at developing a fuller and richer understanding by focusing on the entire activities surrounding events, and not only on the outcome of the events or on just some component of the events. Gorman and Clayton (1997, p. 25) note that "Instead of focusing on just one component of the process..., the qualitative researcher is able to develop a fuller and richer understanding through immersion in the entire activity". Gorman and Clayton add that "Because of its emphasis on the context in which events occur, qualitative research is ideally placed to understand the process of events - how ideas become actions, the reactions to those actions etc.. and the various components of the process"(1997, p. 25). Fidel also observes that qualitative research focuses on processes where it examines the dynamics of a process (e.g, interaction during a search) and that "it neither provides snapshots nor concentrates on products" (1993, p. 225).

The qualitative approach employs in-depth or intensive interviewing and participant observation as its main data collection techniques (Bradley, 1993, p. 441; Bradley and Sutton, 1993, p. 406; Fidel, 1993, p. 221; Glazier, 1992, p. 6; Gorman and Clayton, 1997, p. 45; Westbrook, 1997b). Intensive interviewing and extended close observation allow researchers to explore human behaviour, settings, and situations as well as elicit individual perception, attitudes and opinions regarding issues under investigations. These two techniques are usually used in supplementary mode in that observation requires the questioning of study subjects at least for verification or explanation of some of the observed behaviours, while observation is necessary to confirm whether the study subjects actually do what they say they believe or do.



Observation as a data collection technique is basically the recording of observable phenomena or behaviour in a natural setting relevant to the research question (Gorman and Clayton, 1997, p. 105). Participant observation is where the researcher observes his study subjects by being a part of their world. It is not artificially limited to a specific 'slice' of activity (Gorman and Clayton, 1997, p. 60). The technique relies on "watching, listening, asking questions and collecting things". The participation of the researcher in such observations is managed in such a way that the usual behaviour of the study subjects is affected as little as possible (Mellon, 1990, p. 40).

The qualitative researcher's participation can vary from high to minimum participation. When participating highly, the researcher becomes a fully active player in the lives of the study subjects. In a moderate participation, the researcher interacts with study subjects only in relevant activities on a regular basis. In a minimum participation the researcher interacts with the study subjects in a limited way such as to verify or clarify observations made by him (Gorman and Clayton, 1997; Westbrook, 1997b).

By observing study subjects closely for extended periods of time, the researcher's participant observation allows for gathering data on users' behaviour as it occurs in life situations. Gorman and Clayton (1997, p. 44) state that "By observing data about behaviour in a specific contexts the researcher is able to uncover patterns of behaviour that both reflect otherwise hidden attitudes or views and unconsciously affect participants". As also noted by Westbrook, it gives the here-and-now experience in-depth (1994, p. 243). Researchers will also have access to and understanding of contextual factors with bearing on the attitudes, views and actions, in addition to what the study subjects say. One of the main aims of observation is to gain a deeper understanding than participants say. Knowledge of contextual factors contributes to this understanding. Participant observation also allows the researcher to confirm whether what people say they believe or do is what they actually do in reality. Observations carried out after interviewing enable researchers to compare what people say they do with what they actually do (Gorman and Clayton, 1997, p. 105). Similarly, participant observation permits the researcher to learn about human behaviour that study subjects may not be

willing to report as well as to learn about behaviours that are not recognized by the study subjects themselves. In other words, by participating in the natural setting of the study subjects, researchers will have more insight about the “unconscious behaviour” of study subjects.

In-depth or intensive interviewing is an interactive conversation where research issues are explored at length. Such interviews vary in how structured they are, from the standardized open-ended interview, to the interview guide, to the informal conversation interview. In the standardized open-ended interview, the exact wording and sequence of questions are decided in advance. In interviews using an interview guide, the topics are specified in advance but the wording of them is spontaneous. In the informal conversational interview the questions generally emerge from the discussion itself (Gorman and Clayton, 1997, p. 126).

The in-depth interview allows one to gather as much detailed and comprehensive data as needed from the perspective of the study subjects. The extended period of time that the researchers spend with the study subjects and the casual environment induced by such an interview is believed to enable the researcher to move back and forth within the interview until he gets sufficient and comprehensive data for his research (Westbrook, 1997b, p. 151). Westbrook further comments that the flexibility of unstructured interviewing allows researchers to probe, to clarify, and create new questions based on what has already been said (1997b, p. 151). The informality also provides flexibility to extract the needed data. It enables one to extract in-depth information about personal perceptions, views, understandings of events, processes, and environments of individuals. In this regard, Gorman and Clayton (1997, p. 45) observe that the “dialogue between researcher and subject allows the interaction to move in new and perhaps unexpected directions, thereby adding both depth and breadth to one’s understanding of the issues involved”. The casual conversation may also encourage candour on the part of the study subjects (Gorman and Clayton, 1997, p. 45). As indicated earlier, the in-depth interview allows the researcher to confirm observed behaviour as well.



Besides the two widely used data collection techniques, qualitative research also uses analysis of documents or historical records to collect qualitative data (Gorman and Clayton, 1997, p. 46; Powell, 1999; Westbrook, 1997b, p. 152). Historical records are used to understand the historical development or evolution of a phenomenon of interest (Gorman and Clayton, 1997, p. 46). According to Westbrook documents on study subjects or produced by them (this includes responses to questionnaire surveys of open-ended nature) are also sources of qualitative data. Westbrook includes survey diaries, journals, and papers to be suitable documentary sources of qualitative data (1997b, p. 152). Content analysis is the major data analysis technique in qualitative approaches.

Finally, it should be noted that user-oriented research does not totally exclude the use of quantitative-oriented techniques of data collection and analysis. Depending on the nature of the research problem at hand, relevant quantitative techniques may be used in a basically qualitative research. Many qualitative researchers argue for using quantitative techniques if the research problem contains aspects that requires a quantitative technique. In fact many researchers in LIS see a combined use of qualitative and quantitative techniques as essential as long as the research problem requires that (Dervin, 1992; Dervin and Nilan, 1986; Fidel, 1993; Gorman and Clayton, 1997; Powell, 1999; Sugar, 1995). Some researchers even argue that using both qualitative and quantitative methods can allow researchers to compensate for the inherent weaknesses in each approach (Gorman and Clayton, 1997).

#### **2.2.3.3 Criticisms of the user-oriented conceptualization**

There is a limited criticism specifically against the user-oriented conceptualization of information needs and associated research focuses and methodological approaches in LIS literature. The likely reason for this limited criticism is the fact that the conceptualization and the associated research focuses and methodologies are not yet in wider use. The literature on information needs research shows that the traditional methods and conceptualization of information needs have been dominant up to present (Jarvelin and Vakkari, 1993, p. 139, 140; Julien, 1996; Julien and Duggan 2000; Powell, 1999, p. 99).

Criticisms against the user-oriented conceptualization that have implications for information needs research context are presented below.

Some researchers are of the view that the research methodologies of the user-oriented conceptualization need to be developed further in order to serve their purposes well. These researchers emphasize that the research methodologies are still in the process of development and require work to make them widely applied by the profession. Westbrook (1997a, p. 323) comments that the qualitative approach is being adapted to the needs and circumstances of LIS research and much remains to be done regarding that effort. The need for improved methods in the user-oriented approach is reflected in Nahl (1998, p. 327). A similar view that research methodological approaches in user-oriented conceptualization are still in the process of development and efforts should continue to see them matured is expressed by Morris (1994, p. 24).

In a related criticism, some writers criticise the qualitative approach in relation to some of its research focuses and data collection techniques. The main data collection techniques, namely participant observation and in-depth interviews, are criticised as being time consuming and hence difficult to apply. Both techniques require a considerable amount of researcher time for collecting and organizing data from study subjects (Gorman and Clayton, 1997, p. 106, 125). This reduces the practical applicability of the techniques in studies such as information needs which need to be conducted on a regular basis. Savolainen also expresses doubts regarding the practicality of implementing user-oriented research approaches as follows:

The utilization of 'usercentric' methods seems to be rather labor-intensive; much time and energy must be devoted to each case of information seeking ... These approaches might be best realizable in smaller units of library and information systems whose users and user groups are relatively homogeneous by virtue of the similarity of type and range of problems they deal with. In contrast to this, in large systems like big university libraries with thousands of user, it is hardly possible to go into details of each information needs (1993, p. 25).

One can also argue that asking users what their information needs are through interviewing techniques are in contradiction to the user-oriented view that users have



difficulty in understanding and articulating their information needs. In a related comment, Sutton expresses the view that there would be potential difficulties in getting the data from the participant alone:

Researchers [qualitative] must learn to cope with informants who do not always know the truth or do not always tell it, or who know more than they will be asked or can say. Other problems include conflicting interpretations produced by different observers of an event, the lack of consensus among informants as to the state of affairs in a social context, and the possibility that even a single act by a single person may be driven simultaneously by many, not necessarily consistent, motivations. And to these problems is added the value-laden character of the researcher's own observations (1993, pp. 422-423).

It is also difficult to learn the future information needs that users may have and that information systems have to cater for based on this type data collection.

User-oriented conceptualization is also criticized for lack of a strong theoretical foundation. Hewins (1990, p. 155) states that the user-oriented conceptualization lacks well-defined conceptual frameworks, although it is showing progress in that direction. A call for a theoretical basis for these works is also echoed by Hewins (1990), Morris (1994), Nahl (1998), and Westbrook (1997a).

In relation to research focuses, particularly the focus on the cognitive aspects of users has attracted much criticism. Allen (1996, p. 59) states that the focus on mental entities and processes is recognized as the main weakness of the cognitive approach in general. Because of the difficulty in observing the mental entities and processes, the validity of relying on the cognitive aspects to provide the basis for determining information needs of users is questioned. That it is difficult to determine the state of knowledge of study subjects has also been stated by earlier writers like Wersig (cited in Ingwersen, 1992, p. 118). Furthermore, Allen (1991, p. 5) and Dervin and Nilan (1986, p. 15) make reference to writers who criticise the cognitive focus of user-oriented conceptualization on the grounds that it is based on mental objects and events which are not observable.

The view that information is subjective has also attracted criticism. Many researchers argue that there are constant meanings that information producers intend to transmit and that the responsibilities of information systems are to channel the meanings to potential users (Dervin and Nilan, 1986, p. 15). Some writers also argue that the view that information is subjective undermines the operation of information systems as there will be no criteria for deciding what information content to acquire and provide neither what services to develop and provide to clients (Rohde, 1986, p. 62).

There are also researchers who criticise user-oriented conceptualization in a general sense. Itoga points out that the user-oriented framework also has to go a long way to provide sound conceptualization (1992, p. 336). Hewins (1990, p. 155) points out that the researches that focus on user behaviour rather than the system are still in the initial stages of development. Brittain also points out that qualitative approaches have not been found to be entirely satisfactory (1982, p. 147). Savolainen (1993, p. 25) reflects that the user-oriented research tradition is relatively young to adequately inform information system design and development. Some researchers have also questioned the possibility of basing practice on the user-oriented conceptualization. Particularly, concern has been expressed over the practicality of meeting the ever-changing and individual information needs of users by information systems (Dervin and Nilan, 1986, p. 15; Rohde, 1986, p. 63).

#### **2.2.3.4 Summary of the user-oriented conceptualization**

The user-oriented conceptualization understands information needs as being subjective, situational, cognitive, dynamic and non-specifiable by users. Research in user-oriented conceptualization focuses on the users, the situations in which information needs occur, and the process by which information needs develop. The core research approach of user-oriented conceptualization is a qualitative methodology. The qualitative methodology allows one to study users from their own perspectives. It also allows one to study the context and process of information needs development and satisfaction. A call for improvement on the methodological and theoretical fronts as well research focuses of the



user- oriented conceptualization is being made by different researchers. Other aspects attracting criticism are the subjective assumptions of information and information needs and the practicality of basing information system design and operation on user-oriented research results and views.

#### **2.2.3.5 Conclusions concerning conceptualizations in information needs research**

From the above review of the literature related to the system- and user-oriented conceptualizations, the following conclusions are relevant to this research. To start with, system- and user-oriented conceptualizations as described in this section underlie the information needs research. The review has shown that each conceptualization gives emphasis to basically different areas of concern in information needs and engages in different research practices. Each understands information needs and related concepts in distinct ways and each has preferred focuses of research and dealing with the problems. Based on this, it is concluded that each of these conceptualizations has left out some relevant areas of concerns useful for the understanding of information needs.

From the review it is also clear that the two ideas that have been left out by these conceptualizations are:

- that information needs relate to content and the carriers where the content resides, and
- that information needs are also dependent on the information environment.

The review has also shown that none of these conceptualizations has been universally accepted as a satisfactory conceptualization. On the one hand, the user-oriented conceptualization is still in the process of developing. Some aspects of the user-oriented conceptualization have also attracted criticisms as shown earlier. On the other hand, the system-oriented conceptualization has attracted wide criticisms for a long time, despite the fact that it is still in wide use. Therefore, it is concluded here that none of these conceptualizations has provided an adequate conceptualization and associated research focuses and methodological framework by its own.

Consequently, it is the argument of this research that the inadequacies of each of these two conceptualizations have made information needs research unsatisfactory and left it wanting. What has been described as lack of progress by some researchers in terms of informing information systems design and understanding the essence of information needs is the reflection of the inadequacies of both. In other words, these conceptualizations and their associated research focuses and methodologies have to take responsibility for the overall sense of dissatisfaction within information needs research since these conceptualizations have been guiding information needs research. Thus, it is the view of this research that any strategy to improve on the unsatisfactory state of research into information needs has to start with improving the existing conceptualizations. It is argued here that improving the conceptualization aspect would bring about the needed improvement in information needs research.

It is also discernable from the review that although each conceptualization is covering different aspects of information needs, they both have contributed to the current knowledge of the profession regarding the information needs of users. Researches based on these conceptualizations have been the basis of the profession's knowledge of the information needs of users. In other words, there are features from each that can be used together in order to better serve information needs research. As indicated earlier, many researchers, for example, argue for a combined use of qualitative and quantitative techniques in information needs research in order to increase the number of tools available for addressing more fully the information needs problems fully. It is widely argued that a combined use will compensate for the weaknesses found in each methodology (Britt, 1997; Powell, 1999). Thus, it is also the view of this research that each conceptualization has some view that should be used to improve the state of information needs research in LIS.

The review, therefore, supports the view that we still need a sound conceptualization and accompanying research approaches in order to make information needs research live up to its expectations. A conceptualization that takes advantage of relevant features from each as well as one that incorporates features that have been left out by both is needed.



More specifically, a conceptualization that could provide wider acceptance in the profession in general and that would take into account the fact that information needs are content and carrier related and vary from one information environment to another in particular is needed.

To this end the current research has constructed a model of the information needs of users that could help in developing an alternative conceptualization of information needs. The model is intended primarily to bring to light new insights as to the essence of information needs of users. In conjunction with relevant basic assumptions on the nature of information needs, it is believed that the model will provide an alternative way of looking at information needs. The next section of this chapter will review basic issues of models and model building that have informed the development of the model in this research.

## **2.3 Models and model building**

Basic features of models and modelling are reviewed in this section of the literature review. The review is intended to highlight the characteristics of models which are considered to be helpful for understanding the nature of the model developed in this research. The review is also intended to bring to light those features of models which would make them helpful for addressing the unsatisfactory state of information needs research, namely, developing an alternative conceptualization. The final part of this section further discusses models of information needs to highlight similarities and differences between the nature of existing models and that of the current research.

### **2.3.1 Common features of models**

Broadly, a model is any representation of reality for a given purpose (Underwood, 1996, p.148) or any set of generalizations and assumptions about the world (Meadows and Robinson, 1985, p. 11). However, the widely held understanding of a model is that of a

simplified representation of a phenomenon for a particular purpose as seen from a given perspective (Britt, 1997; Benyon, 1997; Burt and Kinnucan, 1990; Miller and Wilson, 1983; Mouton, 1996; Mouton and Marais, 1993; Rivett, 1980; Swanepoel, 2000b). Some of the features of this understanding are discussed below.

Models are representations of the phenomena they model. They do not reflect the phenomenon in its entirety. They use only selected aspects of the phenomenon in representing it. Their strength is their ability to capture and communicate essential aspects of the phenomenon in order to generate a better understanding of the phenomenon. This representation of a phenomenon through selected features obviously means that a model is not the exact duplication of a phenomenon (Mouton and Marais, 1993; Sayer, 1992). Some writers even go further and indicate that there could be some differences between the models and what they model (Burt and Kinnucan, 1990; Frants, Shapiro and Voiskunskii, 1997; Kaplan, 1964, p. 284 cited in Mouton and Marais, 1993). However, as a representation models have to be as accurate and detailed as required to represent the phenomena for the specific purpose they are constructed (Benyon, 1997; Burger, 1995; Hull, Mapes and Wheeler, 1976; Meadows and Robinson, 1985; Swanepoel, 2000b). For instance, Benyon (1997, p. 49) states that "... the model must be accurate enough for its purposes, highlighting the important features, but ignoring the irrelevant aspects".

Models are also simplified representations of the phenomena they model. The representation of phenomena by models is to simplify the phenomena so that understanding the phenomena is possible. Models are simplified representations because they represent phenomena of interest by their essential or important aspects only. Through models, readers are presented with only the essential features of the phenomena under consideration. Such a presentation makes understanding the phenomena simpler than if the phenomena were presented in their entirety. Underwood observes that by giving only a limited aspect of the reality, models aim at removing the complexity of understanding phenomena of interest (1996). According to Mouton and Marais, models direct the focus to only a selected few aspects of a phenomenon, while ignoring others,



which will make grasping the essence of the phenomenon easier (1993). According to Hellevik (1984, pp. 10-11) "A causal model constitutes a drastic simplification compared to the social phenomena it portrays. Just a few aspects of a complex process have been singled out for attention".

Models are constructed for a specific purpose (Benyon, 1997; Camm and Evans, 1996; Underwood, 1996; Vogt, 1999). Ultimately, models are developed and used to understand or gain insight into complex or difficult to understand or study phenomena (Burt and Kinnucan, 1990; Frants, Shapiro and Voiskunskii, 1997; Rowlands and Bawden, 1999; Swanepoel, 2000b; Vogt, 1999; Underwood, 1996). For example, Underwood (1996, p. 148) states that a model stands in the place of reality in order that we can think, negotiate, play or experiment to gain a better understanding of how the characteristics we have chosen to include in the model perform together. Frants, Shapiro and Voiskunskii (1997, p. 12) maintain that "all scientific models are representatives of an object of investigation with the model's similarity to the object defined in such a way as to allow one to obtain new knowledge about this object". However, depending on how the modelers choose to gain insight into the phenomena being modelled, each model could have a specific purpose to fulfil. A model could be developed with the aim of specifically identifying the major internal components of a phenomenon for the purpose of learning more about the phenomena. A model could be designed to understand the major factors that give rise to the existence of a phenomenon. A model could also be developed to gain new insight regarding how the phenomenon would behave in the future or under a new context. In each of these cases, the models have a specific aim to fulfil in order to understand the phenomenon.

Depending on the purposes for which they are built, the representation of models with selected aspects of phenomena are made from a particularly chosen perspective. As a result, not only are selected aspects of the phenomenon included in the model but also these selected aspects of the phenomenon are in turn presented as viewed from a specific perspective (Camm and Evans, 1996; Doran and Gilbert, 1994; Underwood, 1996). Consequently, a given phenomenon can be represented with different aspects depending

on the perspective chosen by the modeler, each with equal validity. In relation to this Doran and Gilbert observe that

It should be clear that there is not just one model for any particular target. There may be a potentially infinite number of models with some degree of plausibility. An eagle may be modelled by a sparrow, a robin, a moth, a tiger moth, a mathematically specified abstract process and so on; ... It is usually possible to classify this multitude of models in various ways. Some models will be relatively concrete, some abstract. Some will be much more complex than others, and different models will relate to different aspects of the target system. For example, we may have a very simple and abstract or a very complex and detailed model of an eagle; and one model may concentrate upon the eagle's ability to fly, while another may focus on its digestive tract (1994, p. 6).

Kraft and Boyce also note that it is possible to construct different models of similar situations, based on the immediate needs and perspectives of the modeler for the same purpose (1991).

It is also shown that a single phenomenon can be represented differently for different purposes. Kraft and Boyce (1991) point out that there can be many models of the same thing that emphasize different characteristics as appropriate for different purposes:

"There can be many models of the same thing that emphasize different characteristics and that are used for different purposes. They can even be contradictory, as long as they are not used together". This leaves the selection of the concepts, the content and the techniques used in modelling a phenomenon to the modeler (Burt and Kinnucan, 1990). Formats for describing a model include both the verbal and diagrammatic (Keeves, 1994; Meadows and Robinson, 1985).

Perspective here refers to the chosen angle from which the aspects of the phenomena are selected to represent the phenomena. A perspective could be a process perspective, if the nature of the elements selected to represent the phenomena are process related or if the representation is from the point of view of the processes that take place in the phenomena. A perspective can be that of a function if the elements of the model are selected functions of the phenomenon being modelled. A perspective can be that of



determinant factors if the elements are selected factors that influence the nature of the phenomenon.

### **2.3.2 Uses of models**

As indicated earlier, models are constructed to better understand or gain new insights into the phenomena they model. To help in understanding or gain new insight into the phenomena of interest, models are used in a number of different ways. In this section the different ways that models can be used are discussed in a manner to suit the purposes of this research. Accordingly, the different uses of models are discussed in four sections, namely, specifying the essence of phenomena of interest, identifying research focuses and areas, building theories related to the phenomena, and simplification of phenomena being modelled. Although, the nature of models varies from discipline to discipline or from one “school of model building” to another, the review in this section includes all relevant views for its discussion irrespective of discipline or school of modelling from where the views have originated.

#### **2.3.2.1 Specifying the essence of phenomena selected for study**

Specifying the essence of phenomena selected for study is one of the specific uses of models. As mentioned earlier in this section, elements or concepts in models are what are believed to be essential features or aspects of the phenomena being modelled. The selected elements or concepts of models point out what is essential about the phenomena. By discussing their phenomena only in terms of selected features, models communicate that what is shown in the models is what needs to be known about the phenomena. Therefore, through the use of selected elements or concepts modelers specify what constitutes the essence of the phenomena under study. In this connection, Camm and Evans (1996) state that models help in forming an idea of what elements or concepts make up the phenomena being modelled. Similarly, Miller and Wilson (1983) point out that one of the uses of models is to form an idea of what elements or concepts constitute the phenomena. Britt reflects a similar view in that models require modelers to be specific about what they think the nature is of the phenomena that they model: “Models

do, however, force researchers to be explicit about what it is that they are assuming about the nature of a concept as it applies to a particular situation. Models do make it easier to bring up what one believes should be attended to in a particular situation and, by implication, what one believes should not be attended to" (1997, p. 39). Underwood (1996) also implies that models establish what constitutes the essence of the phenomena they model. According to Underwood models establish boundaries of what the phenomena are all about. These boundaries specify what are and what are not considered relevant about the phenomena under study. The boundaries are defined by the component elements and their relationships in the models.

Models also help in articulating the essence of the phenomena they model. The elements or concepts of models provide the key ideas and the language to describe the essence of the phenomenon being modelled. The concepts of models are selected terms and phrases with specified meanings to bring out the essence of phenomena. These elements or concepts naturally form the core terms and expressions that will be used to describe the phenomena under consideration. The essence of a phenomenon being communicated through models is basically a combination of what each element or concept of the model says. In support of this view, Gorrell (1981, p. 132 cited in Mouton and Marais, 1993) states that models generally provide a universe of discourse or way of talking about phenomena under investigation by introducing new terms or by using terms of ordinary language or well-established and familiar theoretical language. Rowlands and Bawden (1999, p.193) also believe that "Models... shape the way we look at reality and frame the language we use to describe it". Benyon argues that a good model effectively provides a language for exploring and experimenting with ideas (1997). Britt's (1997) view and discussion of concepts as building blocks of models indicate that models are essentially concepts representing realities. From this one can argue that when modelling we are actually conceptualizing the phenomenon of interest. Use of selected specific concepts as component elements of models is, thus, actually selecting terms and phrases with specified meaning to describe the phenomenon under consideration.



### **2.3.2.2 Directing to relevant research focuses and areas of investigation**

Models point out relevant research focuses in order to understand or gain new insights into the phenomena of interest. A model of a phenomenon reflects that the selected aspects are those which are needed to be known about the phenomenon. Each element or concept is in the model because of its contribution to the understanding of the essence of the phenomenon. Understanding of each of the component elements, in other words, is essential prerequisite for the understanding of the whole of the phenomenon. Therefore, to gain insight into the phenomenon, research has to focus on each of the elements or concepts of the model. Each element or concept serves as a variable about which data has to be collected in order to gain insight into the phenomenon under study. The elements or the concepts and their relationships demarcate the area of investigation that has to be covered for the purpose of understanding the phenomenon. A number of writers agree with this view. Miller and Wilson (1983, p.73) point out that with clearly presented models, the field of investigation of the reality is conceptualized and significant variables identified to gain insight into or to understand the phenomenon being modelled. Mouton and Marais (1993, p. 139) describe models as tools that provide questions, pointers and directions for inquiry which might, if pursued, lead to a better understanding of the domain under investigation. Mouton and Marais (1993, p. 141) further explain that models “identify central problems or questions concerning the phenomenon that ought to be investigated ” as well as “ limit, isolate, simplify, and systematize the domain that is investigated”. In addition, Mouton and Marais (1993, p.140) argue that models draw the attention of researchers to specific themes and are thus useful in suggesting new areas of research about the phenomena under consideration: “Certain characteristics of the phenomenon, irrelevant for the model, are conveniently excluded, while the most obvious aspects are emphasized. The value of this simplification is that it draws the attention of the researcher to specific themes... The model is, therefore, used to suggest new areas of research because certain relationships and dimensions are emphasized to an unusual degree”. Camm and Evans (1996) describe models as a way of structuring a poorly defined problem. Similarly Britt (1997, p. 5) argues that “the real business of modeling should be helping to ask the right questions and organize the answers”. The use of models for establishing boundaries as pointed out by Underwood (1996) also includes



setting boundaries of areas of investigation related to the phenomena under study. Underwood states that "Boundaries are defined by components, functions and the relationships between them. They serve to group together what is considered relevant to a particular phase of an investigation and to screen out what is not perceived as relevant. In the course of an investigation of a problem or opportunity it is of the utmost importance that the analyst and other participants have a clear idea of the boundaries of what is being studied..." (1996, p. 151).

### **2.3.2.3 Advancing and developing theories**

Although some treat models and theories as one and the same (Miller and Wilson, 1983; Mouton, 1996; Mouton and Marais, 1993; Burger, 1995; Dervin and Nilan, 1986), the literature shows that the concept of theory is broader in scope than the concept of a model. Most definitions of a theory show that it includes aspects of models. For example, a definition of theory by Kerlinger is that it "is a set of interrelated constructs (concepts), definitions, and propositions that present a systematic view of phenomena by specifying relations between variables, with the purpose of explaining and predicting the phenomena" (1973, p. 9 cited in Mouton and Marais 1993, p. 142). Some also show that a theory is broader than a model from the point of view of the functions that each is associated with. For many, a theory has functions that include those of models. For instance, Mouton and Marais (1993, p. 144) point out that the functions of a model consists of classifying, categorizing, heuristic, and discovering while that of a theory consists of classifying, categorizing, heuristic, discovering and explaining, all of which clearly shows that a theory is broader than a model in terms of its constituent parts.

One of the conclusions that this research deduces from the view that the concept of theory is broader than that of a model, is that models could evolve into theory. In this connection the relevant view is that models are precursors of theories as stated by Mouton and Marais (1993, p. 141 agreeing with Gorrell, 1981, p. 130): "most models in social sciences (in contradistinction to those in the physical sciences) are characteristically precursors to subsequent theories". Dervin and Nilan also state that definitional conceptualization is a precursor to forming theories (1986). Giere states that



by suggesting questions that one should ask about the unknown phenomena and the ways of answering the questions, models as a basis of analogies play an important role in scientific research - that is, in the creation of new theories (Giere 1979, p. 79 cited in Mouton and Marais, 1993). Camm and Evans (1996) point out that models could be a source of a theory that could be tested through observation and experimentation. Keeves (1994) also maintains that models make effective contributions to the theoretical understanding and/or advancement of theory. Keeves observes that "The advantages of a mathematical model are many in addition to elegance and parsimony. The model involves the advancement of basic assumptions and postulates that are made explicit and are thus open to scrutiny and questioning. It permits the derivation of explicit quantitative predictions that can be tested with empirical data, and it lays the foundations for a more formal theory built around the causal relationships that are implicitly or explicitly contained within the model..."(1994, p.3868). According to Doran and Gilbert (1994, p. 8) models whose main purpose is to gain new insights to phenomena under study could lead to theory building: "...By constructing such a model [exploratory model], we may hope to gain new insights into the target itself. Such modeling is exploratory in nature, often involves theory building...". Thus models are considered as foundations for advancing theory or developing related theories.

#### **2.3.2.4 Simplifying phenomena for studying and understanding purposes**

Although the uses of models as a means of simplification of target phenomena has been touched upon under the discussion of the common features of models earlier, it is further discussed here for its relevance under this section as well. The simplification of phenomena under study is one of the commonly mentioned uses of models (Britt, 1997; Frants, Shapiro and Voiskunskii, 1997; Keeves, 1994; Kraft and Boyce, 1991; Meadows and Robinson, 1985; Mouton and Marais, 1993; Underwood, 1996). As pointed out earlier, models are constructed basically for simplifying complex situations. Meadows and Robinson state that models are used to understand complex phenomena: "Models are created to simplify the real world, which is too complex to understand in all its detail"(1985, p. 104). Benyon states that models are used because they remove some of the complexity of reality and allow the aspects which the modelers want to stand out

(Benyon, 1997). Frants, Shapiro and Voiskunskii, (1997, p. 12) express a similar view:

Modeling as a method of scientific investigation arose from the necessity to solve problems that for some reason could not be solved directly. Direct investigation of systems is made difficult or impossible when the nature of the system is not easily understood, when the system does not yet exist and the best alternative for its creation needs to be chosen, when the investigation of the system requires much time or effort or is economically unfeasible, and so forth.

Kraft and Boyce (1991, p. 12) also make reference to the work of others that argue the importance of models for the purpose of simplifying reality: "Herbert Simon (1982) has pointed out, in his principle of bounded reality, that man cannot grasp reality in all its complex totality and so must deal with it in terms of a simplified framework or model. Modeling is a basic component of our thought process".

Some writers emphasize the value of models in simplifying particularly the dynamic aspects of realities. Mouton and Marais observe that "In a model...an attempt is made to represent the dynamic aspects of the phenomenon by illustrating the relationships between the major elements of that phenomenon in a simplified form"(1993, p. 140). Britt also states that models simplify reality to bring the crucial dynamics that shape that reality into better focus (1997).

Keeves argues that simplification is the core purpose of model building and sees that the simplification comes from the abstract nature of models. He states that "Without the simplification which is associated with the abstractness of the model, there would be nothing to be gained from building the model" (Keeves, 1994, p. 3865).

Models are shown to simplify reality in a variety of ways. Benyon (1997) suggests that models simplify reality by highlighting only what interests us. Benyon (1997) further adds that models simplify reality by suppressing unnecessary aspects and emphasizing only what is believed essential by the modelers. Underwood notes that models simplify reality by omitting or concealing unnecessary details (1996). Mouton and Marais (1993) observe that models simplify the situation of interest by emphasizing only the most obvious aspects of the phenomena or by excluding all the irrelevant aspects of situations



under study. Finally, for Miller and Wilson (1983 ) and Britt (1997), the simplification of the phenomena under consideration is done by concentrating only on limited aspects or elements of the phenomena that are selected to represent them. One can see that the representation of reality with only selected aspects of it for a given purpose is the means by which models simplify reality. Such simplification enhances understanding of complex situations which would have been difficult or impossible to do so otherwise.

### **2.3.3 The process of model building**

Model building is an iterative process. Initially selected component elements of a model and their relationships pass through continuous reformulation until they provide sufficient representation of the phenomenon. In this regard, Underwood (1996, pp. 151-152) stresses that setting boundaries is always provisional and subject to changes, as better understanding is gained or investigation reveals the need to include additional components. Doran and Gilbert maintain that the initial design of a model is likely to go through revision in order to ensure that it represents that target well (1994). Keeves (1994) says that models go through rebuilding and reforming depending on the outcome of the validity test and as new understanding is gained about the phenomena. Camm and Evans (1996) and Kraft and Boyce (1991) view modelling as a process of enrichment or elaboration, where the approach is to begin with simple models and move toward more elaborate models that capture the complexity of the real situation. The general rule in developing models is to keep them as simple as possible as well as proceed from simple to complex representation when necessary (Kraft and Boyce, 1991; Gilchrist, 1984 and Oakshott, 1997, both cited in Swanepoel, 2000b; Swanepoel, 2000b; Meadows and Robinson, 1985). Generally, simple models are those with only a few variables and basic relationships while complex models involve more variables and detailed relationships among the variables in representing the target phenomena (Britt, 1997; Doran and Gilbert, 1994; Hellevik, 1984).

Different approaches and procedures are followed by different modelers in constructing models (Benyon,1997; Camm and Evans, 1996; Doran and Gilbert, 1994; Kraft and Boyce, 1991; Meadows and Robinson, 1985). In these and other suggested approaches,

the core activities shown in model building are the identification of component elements (concepts or variables interchangeably used) to represent the selected aspects of the phenomena; the specification of relationships (real or assumed) among these elements in representing the phenomena; and the establishment of the validity of the selected elements and their relationships in representing the phenomena for the specific purpose that the models are built. The following paragraphs briefly discuss these major activities in model building.

#### **2.3.3.1 Identification of component elements of models**

According to many scholars, identifying or choosing the component elements of the model through which the target entity is represented is the primary activity (Camm and Evans, 1996; Meadows and Robinson, 1985; Rowley, 1994, p. 82 cited in Swanepoel, 2000b; Swanepoel 2000b; Underwood, 1996). Component elements are those thought to be essential to the understanding of the phenomenon being modelled. They are what a modeler selects as essential to represent the essence of the phenomenon for a given purpose. A modeler can use a range of information sources from which to identify and select appropriate component elements. Abstraction, intuition, observations, theory, personal experience, earlier studies, accumulated evidence, established wisdom, experimentation and any other sources, including hunches or guesses have been identified in one form or another as potential sources for selecting component elements of models (Keeves, 1994; Meadows and Robinson, 1985; Swanepoel, 2000b). The selection of component elements and the degree of abstraction that the elements may have are a continuous process to ensure that they reflect adequately the essence of the phenomena being modelled (Britt, 1997; Camm and Evans, 1996; Keeves, 1994; Kraft and Boyce, 1991; Meadows and Robinson, 1985).

#### **2.3.3.2 Identification of relationships among component elements**

The identification of component elements is followed by specifying the relationships between the elements (Rowley, 1993 as cited Swanepoel, 2000a). The word relationship here refers to the influence that an element or concept has on another element or concept



in a model. According to Swanepoel (2000a) the relationships between variables give an indication of the direct influence they exercise on one another. The relationships among the component elements are basically those which the modeler assumes to exist between the variables or concepts of the model. The nature of the relationships is assumed by the researcher to exist among the elements selected to represent a phenomenon for a given purpose. For a different purpose the same elements may enter into different kinds of relationships. However, as Doran and Gilbert (1994) state the assumptions should be at least plausible and preferably well grounded in empirical evidence. Hellevik (1984) also argues that relationships between variables are assumptions, proposed or substantiated, that a modeler uses for his purposes, just like the modeler decides which variable or elements to include. He states that

In order to perform a causal analysis we have to decide on which variables to include, and how we suppose them to influence each other. The assumptions concerning relevant variables and their causal ordering are the minimal assumptions required of any causal model. In addition we are free to make assumptions concerning the sign or size of the direct effects of a model. We may, for instance, delete an arrow from the diagram, indicating that we assume no direct influence to take place between the pair of variables involved. Or we may indicate that we expect an effect to be positive or negative (Hellevik, 1984, p.42).

Diagrams are the major tools for showing relationships (Benyon, 1997; Camm and Evans, 1996).

### **2.3.3.3 Validating the model**

After component elements and their relationships are identified, the core modelling activity following will be that of establishing the validity of the model in standing for what it claims to stand for. According to Camm and Evans (1996) model validity refers to how well a model represents reality. Testing of models for their validity is generally considered an integral part of constructing models. Although there is no disagreement that models have to be valid representations of the phenomena they model, different views and practices as to how the validity is established is observed among modelers, including whether testing is necessary in some cases. For example, according to the reviews of Meadows and Robinson (1985, p. 40) model validity in system dynamics is

viewed basically as indeterminable. In system dynamics models are assumed to be just simplifications of reality and therefore not totally valid. Modelers in system dynamics consider their models as valid if the models are useful and convincing in sufficiently representing the phenomena to answer the questions the models are constructed to answer. Meadows and Robinson (1985, p. 41) summarize the views of system dynamicists regarding model validity as follows:

The system dynamics paradigm also handles the problem of model validity qualitatively and informally. System dynamicists use no precise, quantitative index to summarize the validity of a system dynamics model. Reference is usually made not to absolute validity, but to model *utility* or to building *confidence* - is the model sufficiently representative of the real system to answer the question it was designed to answer, and is its structure convincing enough to induce someone to act on its conclusions?...

In fact according to Meadows and Robinson validity testing is among the three problems that recur in all modelling techniques (1985) and stress that "The issue of model validity is an unresolved one in every modeling field"(1985, p. 41).

Usually model validity tests focus on specific aspects of models (Britt, 1997; Camm and Evans, 1996; Randers, 1980, cited in Britt, 1997; Swanepoel, 2000a, citing Kwak and Delurgio, 1980) depending on the specific purpose for which the models are built for, such as, descriptive, explanatory, and predictive purposes. Testing could be done to validate the elements of a model or the relationships in the model or a combination of these, in meeting the set purposes. A single or a combination of possible tests could also be conducted at a time. However, experience as found in the literature shows that testing is a long process and the tendency is to focus on conducting one type of test at a time, where the earlier tests pave the way for further testing. It is common that a single type of testing could be done repeatedly or at different locations before the results are confirmed, making the time consuming nature of testing a common feature of model building.



#### **2.3.4 Summary of common features of models**

Models are simplified representations of phenomena of interest. They are meant to capture only the essential features of the phenomena of interest. Although models are constructed to gain insights into the phenomena being modelled, how each modeler aims to gain the insights gives each model specific purposes to achieve. Constructing models consists broadly of identification of component elements, identification of relationships between component elements, and confirming the validity of the usefulness and accuracy of the component elements and their relationships in representing the phenomena being modelled. The uses of models for specifying what constitutes the essence of phenomena, identifying research focuses in order to understand the phenomena, advancing theory regarding the phenomena, and simplification of complex or ill-defined phenomena are emphasized in this section of the review.

#### **2.3.5 Models of information needs in LIS literature**

The LIS literature shows that there has been some effort in modelling the information needs of users in the past. In this section existing models of information needs are reviewed to show their general characteristics so that similarities and differences with the current model come to light. Some models of information behaviour with information needs as their component element are also reviewed here to further add to our understanding of how information needs have been understood and represented in LIS.

##### **2.3.5.1 The sense making model**

One of the widely cited models of information needs is the sense-making model. The sense-making model is developed to represent the essence of the information needs situation of users (Dervin and Nilan, 1986). The model, developed by Brenda Dervin and colleagues, consists of situation, gap, and uses/helps as its component elements. *Situation* “refers to those events in a person’s life that create the context for a lack of sense, or gap, [that is], an occurrence that raises questions” (Dervin and Dewdney, 1986, p.507). It covers the specific events and experiences where users found themselves stopped in

making progress in life and needed answers to keep moving. *Gap* refers to the discontinuity users perceive or the specific questions that they have in mind because of the situations that stopped them from making progress. The *gap*, as perceived by the user, is that which is translated into questions. *Uses/helps* refer to the use that is made of the answer - what the seeker/user hopes to do with answers. *Uses/helps* cover what helps users expect from the answers. Dervin (1992, p. 70) states that "The metaphor [model] is a highly abstract one seen as applying at all levels (intrapersonal, interpersonal, small group, organizational, mass, telecommunication, databases, societal) of information use and information-seeking and in all contexts (health, political, scientific, instructional, etc.). It directs attention to the steps the actor takes as defined on the actor's own terms to address the gaps he or she faces as defined on his or her words".

According to this model, all information needs (gaps) arise from a discontinuity or gap in one's knowledge and the gaps always arise from situations. Dervin and Dewdney (1986, p.507) state that "Briefly, the approach posits that information-seeking and information-using occur when individuals find themselves unable to progress through a particular situation without forming some kind of new "sense" about something. The information needs are thus situationally bound". Information needs specifically are represented by the gaps in one's knowledge, which is operationalized as questions in users' minds. The model, thus, represents information needs as situational, cognitive (ideas) and subjective. However, information needs are treated here as related to content only.

#### **2.3.5.2 Person-in-situation model**

Allen's "person-in-situation" model of information needs posits that personal and social factors concurrently influence the information needs of users. Consequently his model consists of personal and social factors influencing the nature of problem situations that give rise to information content needs and the personal and social factors that influence the understanding and the resolving of problem situations:

In this person-in-situation model, we see both personal and situational variables as posing constraints on behaviour or on courses of action. This occurs at two levels. The first is the level of the situation that gives rise to the problem. Here the nature of the problem is determined by individual



and social influences as they permit the possible courses of action to rise above one, or to drop to zero. The second level is the information-seeking process. Here, perceiving the problem, identifying alternatives, and selecting an alternative use resources that are determined by individual and social variables. For example, the knowledge resources necessary to perceive a problem are part of an individual's cognitive structures, but at the same time are derived from a socially-constructed understanding of the situation in which the individual is found (Allen, 1997, p. 120).

The author argues that his model can be seen as a guide for research in information science, and as a basis for developing principles that will guide the development and design of information systems. He specifically comments that his model can contribute towards addressing the problems of traditional research as expressed by some of the proponents of the system-oriented approach to information needs. He also adds that his model carries with it the seeds of a principled approach to user-centered information system design. The model treats information content needs as cognitive, social, situational and difficult to understand and articulate. However, it focuses on information needs as related to content needs only.

#### **2.3.5.3 Models of information behaviour with information needs as a component element**

In Wilson's (1981 and 1999) information seeking behaviour model, information needs are depicted as composed of factors arising out of basic human needs which themselves arise out of personal, interpersonal, and environmental contexts within which users live or work. The personal context includes cognitive states of the user, the interpersonal includes role demands of the user's work or life, and finally the environment context includes the political, economic, technological, etc. aspects within which the life or work of the user takes place. In short information needs in Wilson's information seeking model are represented by personal, social, and environmental factors that give rise to it. In this model as well, only the content aspect of information needs are emphasized.

In the information seeking model of professionals developed by Leckie, Pettigrew and Sylvain (1996), information needs are depicted as composed of factors arising out of

situations pertaining to specific tasks that are associated with one or more work roles played by professionals. It is further represented as shaped by the individual demographics, context, frequency, predictability, importance and complexity (Leckie, Pettigrew and Sylvain, 1996). The authors note that

It should be pointed out that each factor in the information need component of the model exists on a continuum of intensity and interacts with the others in a complex fashion. For instance, an information need could be unforeseen but relatively unimportant and its solution not needed immediately, while on the other, an unexpected need could be of great importance and extreme urgency. The level of complexity, the degree of importance and urgency, and whether the information need is anticipated or unexpected together will affect the information-seeking activity undertaken (Leckie, Pettigrew and Sylvain, 1996, p. 183).

Again, information needs are represented by factors giving rise to them. Information needs in this model also relate to content needs only.

Mick, Lindsey and Callahan's (1980) generalized model of STI (scientific and technical information) information seeking comprises of environment, situation, attitudes, stimulus, information need, general action plan, specific action, and evaluation of action as its component elements. In this model information needs are shown as arising from a "stimulus" which in turn arises within a context of a particular situation which occurs within an environment and a set of attitudes. Situations include specific task situations and work roles and functions; the environment includes the immediate environment and the norms in effect there; attitude refers to users' attitudes to information and users' perceptions of management attitude toward information. Furthermore, what Mick, Lindsey and Callahan (1980) refer to as a macroscopic model for looking at information behaviour implies factors affecting users' information behaviour in an organizational context. These factors are individual variations, individual tasks, job types, work environments, the organizational environment, the institutional environment, the structural environment and the cultural environment. Work environment refers to the work-group and/or immediate environment. Organizational environment refers to the large scale environment such as the division or research laboratory. The institutional environment is concerned with the nature of the institution such as a corporation, a university, or a federal agency. Structural and cultural environments refer to more generic



levels such as industry, the sociopolitical environment and culture (Mick, Lindsey and Callahan, 1980). Information needs of users here are represented by the factors giving rise to them in an organizational setting and refer to content needs only.

Sonnenwald and Iivonen's (1999) proposed "integrated human information behaviour research framework for information studies" to understand human information behaviour, including the information needs of users. The framework consists of personality, matter, energy, space and time as its facets. Personality refers to users and their social networks; matter refers to information and information resources, including services and technology that may provide access to information; energy refers to users' tasks, processes, and goals; space refers to the users' environment, including physical space as well as organizational and sociopolitical contexts; and time is the non-spatial continuum in which actions and events occur. Although Sonnenwald and Iivonen developed the framework primarily as a research tool, their framework can be seen as a model of information behaviour. The authors' approach to information behaviour is based on the premise that human information behaviour, including information needs, use, communication and seeking, is multifaceted, and in various processes and situations these multifacets, or factors, occur together and affect each other. Therefore, from this framework one can infer that the information needs of users are multifaceted whose component elements relate to personality, matter, energy, space and time as defined by the authors.

Similarly MOHAWC (Models of Human Activities in Work Context) developed by Rasmussen, Pejtersen and Goodstein (1994, cited in Sonnenwald and Iivonen, 1999), which was also developed primarily as a research tool, consists of work domain problem space; tasks; mental strategies, heuristics, and tactics; role allocation; and management style and culture as its component elements. This model frames information needs as particularly associated with work tasks of users in work environment. At the same time, the other dimensions or facets of the framework in one form or another are influencing the task, and hence the nature of information needed by users. The framework focuses primarily on the cognitive aspects of information behaviour as

influenced by the different facets of the framework, although it acknowledges a number of factors are influencing it.

In other information behaviour models where information needs are component elements but not discussed in as much detail as in the above, some important aspects that relate to the current research might be discerned. For example, in Westbrook's (1997a, p. 331) information seeking model, information needs are understood as a "recognition of a 'conceptual incongruity' in which 'internal sense runs out' so that 'there is insufficient knowledge to cope with voids, uncertainty, or conflict in a knowledge area'". Similarly, the cognitive model of IR interaction of Ingwersen (2000) regards information needs "as an 'incompleteness' or a 'gap' in the current knowledge or understanding of the actual user", which is further shown to be related to the content needs aspect of information needs. In Saracevic's (1996) model of the IR process, one can see information needs represented by a query which is implied in the model to be a product of the environment, situation, and user cognitive aspects that the user finds himself in.

The cognitive model of IR interaction of Ingwersen underscores IR interactions as interactions of various cognitive structures (Ingwersen, 2000). These structures are represented in the model by Information Objects, System Setting, and Cognitive Space of the individual as components of retrieval during interaction. Information needs is an aspect of the individual user's cognitive space. The Cognitive Space contains work task or interest, current cognitive state, problem situations, uncertainty, and information need. According to the model, actual work tasks or interest that an individual performs in a given social and/or organizational context may end up as problem situations. These problem situations finally generate a wish for external information, namely, information need. The aspects of the cognitive space are influenced by the social and /or organizational context, including domain, in which the users exists: "The individual cognitive space and, in particular, the current cognitive/emotional structures and states are determined by the experiences gained through time in a social context (Ingwersen, 2000, p. 207). Information needs in the model also refer to that of content needs. At the same time these content needs, as well the problem situations and uncertainty are viewed as cognitive, dynamic, situational and difficult to understand and articulate.



#### **2.3.5.4 Conclusion on the models of information needs in LIS literature**

This brief discussion of models of information needs of users highlights two major points. Firstly, the nature of information needs reflected are essentially user-oriented, that is, cognitive, situational, subjective and non specifiable. Secondly, the dominant perspective adopted in selecting the nature of elements and their relationships is that of factors affecting information behaviours of users. As will be shown in the later chapters of this thesis, the current research is similar to most of these models in the two accounts. However, it also reflects new features and common features but differently interpreted in order to be able to address the shortcomings of research in information needs identified in Chapter one of this thesis. With the above discussion, then we can conclude that there is a growing body of literature of which the current research can form a part. It should further be noted that much of the work on modelling information needs has the print information environment as its context since most of these models had been developed before the widespread existence of the electronic information environment. In fact much of the knowledge of the LIS profession regarding information needs in general is based on what has been learnt in the context of the print information environment. In Chapter three of this thesis, the role of information environment on the nature of information of users is discussed.

#### **2.4 Summary**

The first part of this chapter has outlined that two differing conceptualizations underlie information needs research in LIS, namely, system-oriented and user-oriented. These conceptualizations differ in their views of the essence of the nature of information needs and associated research focuses and methodologies. Both have attracted criticisms from information needs researchers. As a result information needs researches have been carried out without a universally adopted understanding of the concept of information needs and associated research focuses and methodologies. The review has further revealed that information and information needs exist as content and carrier related in inseparable ways and that the physical form of information in which information content

is made available for users' access and use influences users' needs have not received due attention in both conceptualizations.

The second part of the chapter has revealed that models are generally simplified representations of phenomena they model for specific purposes. It has been shown that models can be used to specify the essence of the phenomena they model, help identify research focuses or areas of investigation to study the phenomena they model, help develop and advance theories related to the phenomena they model, and simplify the phenomena they model for the purpose of understanding. Constructing a model is also shown to involve basically the identification of component elements of the model, specification of the relationships among the component elements, and validation of the model. It is further pointed out that there are differing approaches to the process of building models, particularly with regard to how and whether to test the validity of models. Since it is a lengthy and demanding process, validating the model developed in this research was not considered.

Finally, this chapter has shown that there have been attempts to model the information needs of users, mainly in the print information environment. Most of the models reflect information needs as related to content only and as cognitive, situational, subjective and non-specifiable. Most of the models have also represented information needs with factors giving rise to information needs.



## CHAPTER THREE

### ASSUMPTIONS AND PREMISES ABOUT BASIC CONCEPTS IN THE MODEL OF THE INFORMATION NEEDS OF USERS IN THE ELECTRONIC INFORMATION ENVIRONMENT

#### 3.1 Introduction

This chapter discusses key assumptions and premises that the current research holds regarding information needs and related concepts. As indicated in Chapter one of this thesis, the identification of key assumptions is one of the specific objectives of the research. Discussion of key assumptions and premises elaborating on the relevant nature of phenomena of interest is necessary when using a model for the purpose of conceptualization of the phenomena. This is so because a model brings out the essence of the phenomenon being modelled in a simplified and abbreviated form. As a result, the model alone cannot be adequate for communicating the essence of the phenomenon in detail. Further elaboration on the aspects of the phenomenon that the modeler wants to communicate can be given with discussion of assumptions and premises in an attached text to the model. In this way discussion of assumptions serve as a supplement to the model in revealing the essential features of the essence of the phenomena being modelled. The same applies to the model of information needs of users developed in this research. The model brings out what is essential about the essence of information needs of users in the electronic information environment. However, as a simplified representation of information needs, the model cannot tell everything about the essence of the information needs of users in the electronic information environment. Additional discussion of important assumptions and views incorporated in the model but not explicitly shown is thus necessary to give a complete account of the nature of the information needs being reflected.

The assumptions and premises presented here will also help clearly show the features that distinguish the alternative conceptualization that this research supports. As shown in

Chapter two of this thesis, the existing conceptualizations guiding information needs research do not emphasize information needs as content and non-content related needs in inseparable ways while the conceptualization being promoted here considers this as critical. In this research, the assumption that the physical form in which information content is made available influences the information needs of users is also emphasized. However, the issue of the physical form of information has not received due attention in the existing conceptualizations. Therefore, the discussion on the assumptions that are meant to be used in conjunction with the model also serves as a means of revealing the distinguishing features that the alternative conceptualization of information should have.

The key assumptions presented in this chapter can be grouped under two categories. The first group forms the core underlying assumptions regarding the relevant nature of information needs and related concepts. The core assumptions and premises specifically relate to the nature of information needs that this research has argued to have been ignored by existing conceptualizations of information needs. These consist of assumptions on information, information needs, and the physical form of information. The discussion draws on the literature of LIS to show that there are supporting evidences that information and information needs exist in a content and non-content form and that the physical form in which information content is made available influences users' needs. These assumptions and premises aim to bring to light and establish that information and information needs are inseparably content and non-content in nature and that the physical form influences information needs of users. These assumptions hold true for both the print and the electronic information environment. The second group consists of assumptions on issues necessary to understand the nature of the model developed in this research. The assumptions in this group reflect views held by this research regarding important issues for understanding of the model. These assumptions relate to information use and the physical setting in which information needs arise and are met. The assumptions and premises presented in this chapter are largely derived from past research in LIS.



### **3.2. Definition of information and related assumptions**

Information in this research is viewed as a bidimensional entity composed of content and non-content aspects. The content aspect of information refers to facts, figures, ideas, concepts contained in some information carrier. The non-content aspect of information refers to the physical carriers in which information content, that is, facts, figures, and concepts, reside. Although the non-content aspect can broadly include all that is not content related, in this research it is limited to the physical carrier only. Therefore, in this research the ideas non-content and carrier are used interchangeably. The physical carrier consists of basically information sources and channels where information content is stored and accessed. Carrier thus includes documents, print and electronic, and channels of transfer of information content such as information systems of all types. From the users point of view and in the context of information systems, content always exists in some carrier. The carrier is as important as the content for the existence and subsequent use of information. The sources and channels of necessity have to be dealt with first before one deals with the content. This is because one has to interact with and access information sources and channels before accessing and using the information content that resides in some information sources and channels. The carriers are there to facilitate storage and access to information content. The carrier gives the physical embodiment and existence to the content. The content does not exist without some carrier. Consequently, in order for a user to get access to and use information content, he first has to effectively access and use the carrier in which the content is stored. As the discussion below will present, the view that information exists as composed of content and non-content forms is reflected in one form or another in the literature of LIS. Although an understanding of information as composed of both content and non-content aspects is not new in LIS literature, what is stressed in this thesis is that one without the other cannot satisfactorily be understood.

In the LIS literature, information has been understood variously. In this regard, Buckland (1991) identifies three principal uses of the concept of "information": information-as-process...information-as-knowledge...information-as-thing". Wilson (1981, p. 3)

discusses the various ways that information has been viewed in user studies:

The word 'information' is used, in the context of user-studies research, to denote a *physical entity* or phenomena (as in the case of questions relating to the number of books read in a period of time, the number of journals subscribed to, etc.), the *channel of communication* through which messages are transferred (as when we speak of the incidence of oral versus written information), or the *factual data*, empirically determined and presented in a document or transmitted orally.

Wilson implies that any of these definitions could do to explain what information is, provided they are used appropriately to the level and purpose of the investigation.

Similarly, Rasmussen (2001, p. 13) states that "To some, a book or news article, per se, is information. To others, it is the content not the physical embodiment that constitutes information, or information comes when a reader ingests the content into his or her own knowledge structure" .

Although some scholars argue that information is understood with the emphasis on content only (Buckland, 1991) or non-content only (Vakkari, 1998), reference to both aspects as being part of each other or going together are also found documented in the LIS literature. One of the direct references to the perception of information as composed of both content and non-content aspects is that found in Taylor's (1986, p. 8) comment:

There is a need to distinguish between two things: the *information content* of a message, and the *services* or *resources* that provide or contain the messages... These are frequently mixed in discussion and block good communication. In commonsense terms, information is the content of message, the "meaning" that which informs or that which influences a decision. *Information resources*, on the other hand, are the services, the packages, and the support technologies and systems used to generate, store, organize, move, and display these packages. We manage information resources so we can raise the probability that the content of formal messages, that is, the information, will be useful to a client or group of clients sitting in a particular environment with particular kinds of problems.

The following argument by Buckland (1991, p. 352) shows the need for both content and non-content aspects to receive emphasis particularly when used in describing information in the context of information systems:



Information-as-thing is of special interest in the study of information systems. It is with information in this sense that information systems deal directly. Libraries deal with books; computer-based information systems handle data in the form of physical bits and bytes; museums deal directly with objects. The intention may be that users will become informed (information-as-process) and that there will be an imparting of knowledge (information-as-knowledge). But, the means provided, what is handled and operated upon, what is stored and retrieved, is physical information (information-as-thing).

Buckland argues that "A key characteristics of 'information-as-knowledge' is that it is intangible: one cannot touch it or measure it in any direct way. Knowledge, belief, and opinion are personal, subjective, and conceptual. Therefore, to communicate them, they have to be expressed, described, or represented in some physical way, as signal, text, or communication. Any such expression, description, or representation would be 'information-as-thing'"(1991, p. 351).

Badenoch, et al. (1994, p. 13) bring out the bidimensional view of information based on the literature they reviewed and state that

In a sense, this dichotomy corresponds to the simple 'medium-message' distinction...So while most of the definitions of information mentioned so far come under the heading of epistemic [where information is considered in the context of human knowledge and understanding], most of them also recognize that we must take account of systemic (or process oriented) [where information is studied in the context of a particular means of physical representation] factors. However, we may consider the desire to optimize the performance of, say, a library as a systemic, but this is only possible by improving its contribution to people's knowledge. So, what may seem like a systemic problem may require epistemic inputs. The point also serves to highlight the difficulty in drawing the line between medium and message in many situations.

In summarizing their discussions on views of information, the authors indicate the recognition of the non-content (system) aspect of information in the epistemic view where "system dependency" is one of the key characteristics of information in the epistemic view. Under this characteristic they state that "... Message must be carried by a medium. People have to learn how to use this medium (from learning language to remembering telephone numbers and recognizing icons) to get the most out of the message" (Badenoch, et al.,1994, pp. 15-16). This shows the emphasis that needs to be

given to dealing with the medium effectively in order for users to receive the content of desire. It shows the interdependence of content and the medium in helping users to resolve their information needs. Learning how to use the medium involves gaining knowledge and skills that enable users to interact with the medium and the content therein through training and actual experience.

Salasin and Cedar's (1985, p. 95) attributes of information indicate that information is perceived as composed of basically content and non-content aspects: "The attributes include relevance, timeliness, comprehensiveness, authoritativeness, specifiability (distinctness of representation), locatability (distinctness of physical location), accessibility (ease of acquisition, including cost), and usability (suitability of form and content for the intended use) ...". These attributes refer to both the content and/or non-content aspects of information. While some of them relate specifically to the content nature of information, such as comprehensiveness, authoritativeness, others relate to both content and non-content aspects of information, such as usability, locatability and acquirability.

In addition to the above writers who make direct reference to information as composed of content and non-content elements, others reflect views that indicate that information is of both a content and non-content nature. Some writers (Bystrom and Jarvelin, 1995; Taylor, 1986; Vickery, 1997) simply stress the necessity of different non-content aspects for the existence and use of information. Bystrom and Jarvelin (1995, p. 193) note the role of channels and sources for the existence and use of information: "Information is accessed through various channels ([for example], colleagues, phone catalogues, and retrieval systems) from various sources ([for example], colleagues, reference books, and internal memoranda). From the worker's point of view, a source contains (or is expected to contain) relevant information, whereas as a channel guides (or is expected to guide) the worker to pertinent sources". Similarly, Vickery (1997, p. 460) observes that "... A recipient seeks a potentially informative message, and must first select a channel; this may involve searching through a set of channel designations. This done, the recipient searches a set of messages (representations) to extract a message". Along the same line of



thought, Taylor (1986, p.13) stresses the role of information services and supporting technologies and systems for the existence and use of information: "... In discussing value-added processes we are talking about the second category above - information resources, and how these information services, technologies, and systems increase the probability that clients in a given environment will find useful messages in the systems output". Accordingly for Taylor, the non-content aspect is as critical as the aspect of content from the point of view of the use of information. He further comments that "Despite the variety of historical reasons and mandates for information systems, the ultimate objective of information system design must be the construction of a system that will enhance the delivery of useful information in some usable chunk at the right time to the right place" (1986, p. 29). 'Usable chunk' from Taylor's point of view implies that content has to be made available in a useful form and only if non-content aspects play their roles in a such a way that content could be in a usable form.

Other writers also show the inseparable but distinct existence of content and non-content aspects of information using the context of the process of communication. Wilson for example, comments that "In information transfer it may be a fact, an opinion or a piece of advice that is transferred orally, or a physical document 'containing' the fact, opinion or advice may be given to another person. We can choose to study the facts, ideas, advice or opinions, or the nature and distribution of the documentary 'containers'" (1981, p. 5). Vickery (1997, p. 460) also argues that "... in any human communication, we presuppose that a message can only be understood and assimilated by a recipient if the source has uttered in using a code or language common to both participants". He further points out that during the act of communication what is exchanged between the source and the receiver at the surface level is a physical entity bearing a coded message, which is content.

Information is also viewed as bidimensional in the electronic information environment as discussed below. Middleton, McConnell and Davidson (1999, p.225) point out that for electronic information to serve its purposes, it has to incorporate content; accessibility, because content is meaningless without it; relevance; and currency. Marchionini, in his

book on the topic of information seeking in the electronic information environment, treats information as being content and its physical representation and states that “the objects of information seeking are ideas and their many representation” (1995, p.21), referring to the different non-content aspects involved. Pullinger’s (1999) discussion of the relevance of electronic resources shows that electronic information has to feature both content and non-content aspects depending on the contextual requirements to prove relevant to users. The contextual requirements indicated by Pullinger include technological infrastructure (1999, p.164). In Lee (1996) and Neal (1999) it is shown that the content-carrier/artifacts treatment holds for the electronic environment, too. In relation to acquisition of electronic information sources, the selection criteria that are peculiar to the electronic form show that both the content and the non-content features of information are equally critical (Dillon and Jul, 1996, p. 203; Johnson, 1996, p. 16; Johnson 1997, p. 95; LaGuardia and Bentley, 1992; Fecko, 1997, p. 11). In the context of selection criteria for electronic document delivery as well, Morris, Woodfield and Davis (1999, p 136) show that users’ needs involve both content and non-content aspects of information. According to Morris, Woodfield and Davis (1999), the non-content needs include technological feasibility and reliability and infrastructural compatibility. Finally, the use of information from the Internet is also shown to be partly dependent upon its non-content aspects such as the technical characteristics of information technologies and the institutional arrangement that define, govern, and constrain the provider/user relationship (Lan and Falcone 1997, p. 253). The distinguishing features of the electronic information environment are discussed later in this chapter.

Although ultimately the consensus among the above writers seems to be that content needs should be met, the equally important contributions of the non-content aspects of information, to the extent that one without the other is impossible to conceive, is acknowledged. In fact, some view the treatment of information undifferentiated between content and non-content as a source of confusion or even as the major drawback in information uses and needs research. Taylor (1986, p. 8) refers to the confusion resulting from the mixed use of the concept of information content and carriers by observing that “ These are frequently mixed in discussion and block good communication”. Vickery comments that the concept of information has been used in a confusing way. He argues



that “The term ‘information’ has come to be an all-purpose word, used in a variety of contexts, and often discussions do not clearly distinguish between information concepts that belong in different contexts. It should be stressed that discussion of ‘what information really is’ are misguided”(1997, p. 458). Wilson (1981, pp. 3-4) also shares the view that the multiple uses of the term ‘information’ cause confusion because researchers sometimes fail to distinguish between one sense and another, or simply leave the reader to discover which sense is meant by reading the paper or report.

Therefore, in line with this combined approach to the understanding of information, in this thesis the concept of ‘information’ is treated as composed of content and non-content aspects. Each aspect performs a role in what information is and one without the other is incomplete. This research stresses that when it comes to resolving problem situations, both aspects of information, namely the content and non-content contribute differently and complement each other. One without the other cannot effectively serve its purposes. Above all, users have different needs for each aspect, which unless both types of needs are met, resolving of knowledge gap for which information content is required cannot take place. Therefore, in this thesis information is treated as a bidimensional entity with each part contributing to the existence and full understanding of it.

### **3.3. Definition of Information needs and related assumptions**

The information needs of users are understood in this research to be bidimensional in that they are composed of content and non-content related needs. They are bidimensional because users’ needs for information relate to both the content and non-content aspects of information. Although the view that user needs relate to content and non-content has already been with us in different guises, in this research the information needs of users are viewed as always existing in a bidimensional form of content and the non-content aspects. It is the view in this thesis that one aspect without the other is incomplete and would not adequately represent information needs. Content and non-content needs are inseparable because the need for information entails the need for every component necessary for its existence and use. As indicated earlier in this section, the components of

information necessary to its existence and use are its content and non-content parts. The term 'content needs' here refers to users' needs for specific facts, figures, ideas, and concepts in order to fill in their gap in knowledge. Users' needs for information content arise when what they know is less than what they need to know in order to understand and address problem situations they encounter in life. The term 'non-content needs' refers to users' needs related to how the content is made available for users' access and use. The non-content needs are carrier related because they arise out of the capabilities of the prevailing carriers and users' skills in interacting with the carriers. Information content has to be made accessible and usable within the constraints of the capabilities of the carriers where content always resides in order for users to receive relevant content to resolve their gaps in knowledge. The content also has to be made accessible and usable within the limits of the personal skills of users in interacting with the carriers. Only when the carriers are within the users' ability to access and use them, can the content residing in the carriers be accessed and used to resolve felt gaps in knowledge. As mentioned earlier in this chapter, carriers have to be encountered first before one reaches the content (Vickery, 1997, p. 460; Taylor, 1986, p. 8). Whatever happens between the users and the carriers affects whether or not the content is accessed, used, and assimilated. The inseparable nature of the bidimensional aspect of information leads to the fact that the needs for information in resolving problem situations or felt gaps in knowledge relate to all the constituting components of information. Therefore, carrier related needs are needs that users experience as a part of their needs to resolve felt gap in knowledge. In addition, for different reasons users develop and maintain a given preference or understanding of a given possible way of interacting with the sources and channels that contribute to the users' overall need for information in fulfilling felt gaps in knowledge. These needs and preferences are part of the user's need for information to fill in perceived gaps in knowledge. What users need, and what information needs should refer to, are needs for meeting the perceived gap in knowledge which has made achieving or moving ahead in life difficult or even impossible. For information needs to be met, both the content and non-content aspects have to be fulfilled, and one without the other makes the need remain unfulfilled. Thus, what users need in order to resolve the felt information gaps,



from content to whatever may affect accessing and using the content, constitutes the information needs of users.

The major tendency in the understanding of information needs in LIS literature relates to its content needs only. This tendency can be seen in this view from Rohde (1986, p. 54)

Information need is thus seen as a subjective, relative concept existing only in the mind of the experiencing individual... It has been defined as the "recognition of the existence of uncertainty" ... and described as something which prevents an individual from making progress in a difficult situation ... or as the gaps individuals may perceive in their pictures of the world which they may try to fill with inputs from messages...

Wilson (1981, p. 9) also suggests that content aspects are what is commonly referred to in the discussion of information needs.

On the other hand, although not put the way argued in this research, discussions that suggest or point out that information needs are composed of content and non-content aspects have been put forward by a number of writers in LIS literature. Firstly, some writers point out that users' needs for information are composed of content and non-content features. In one of the earliest ARIST reviews of information needs and use studies, Herner and Herner (1967, p. 3) observe that "There are in fact two types of needs that are continuously discussed and confused. One has to do with *kinds* of messages in terms of subject, currency, etc. and the other relate to means of supplying them". In a similar review, Lin and Garvey (1972, p.10) state that "Information needs differ in substance as well as in source... More systematic efforts are needed, though, to isolate factors generating different information needs in terms of their substance and/or source". Taylor's (1986, p. 15) comment that "Somewhere in the input process [information systems], someone has made choices of data types or information packages, based on knowledge, however limited, of the probable needs of the clientele or customers of the system" further points out that the "probable needs" are of content and non-content aspects, namely, "data types and information packages". According to Harter (1992) information needs are assumptions that would have to do with facts relating to the general area of inquiry, including the reasons why information is needed, as well as

assumptions dealing with the nature of the literature treating that area, and how to go about finding that literature. Grover (1993, p. 99) points out that “the individual information user represents a confluence of individual preferences and abilities for information processing, combined with a set of roles”. Continuing, the author says “therein lies the challenge in diagnosing information need: to determine not only what information is needed but also what information package can be prescribed that addresses the preferred information processing style of the individual”.

The perspective that the information needs of users are bidimensional is reflected by Westbrook in a more detailed manner as follows:

User needs embraces all experiences of an individual associated with the search for information. These experiences include those that are internal (e.g, thoughts and motivations), external ([for example], the activity of running an OPAC search), unrelated to libraries ([for example], asking a friend), and aborted ([for example], deciding that a need is not strong enough to warrant the effort necessary to satisfy it). Some times referred to as information needs, this developing area requires an interdisciplinary perspective because it involves every aspect of the ISE [information seeking experience] from the psychological impact of a counter-style reference desk to the educational subtext of help-screen design to the sociological impact of economic class on willingness to seek assistance to the semantic of question formation (1997a, p.318).

Finally, Taylor’s description of the relevant information systems that are meant to meet users’ needs clearly shows that users’ needs are related to both content and non-content aspects (1986, p. 41):

As a result of present approaches, our systems and those who design and interpret them, tend to respond only to such concerns as “what do you want to know?” and they do this rather well. ... In the context of the problems cited above, however, there are other equally important concerns that need to be responded to: “How do you need to know it?”“Why do you need to know?”“In what form do you need to know it?”“What do you know already?”“What do you anticipate finding?”“How will this help you?”“ What does your problem look like?”.

Secondly, some writers merely draw attention to the importance of meeting non-content aspects of information, along side the content needs, in order to address the information



needs of users. Baker and Shrode note for example, that "Investigating the elements of an institution's needs for information and the best way to offer it is extremely complicated. Traditional collection development criteria can be used to select electronic bibliographic databases. However, the next step - to determine the format or method of delivery - is becoming more complex in the academic library setting ..." (1999, p. 155). For Harloe and Budd (1994, p. 85) a "Decision (whether to own or to provide access to) should be based first on the needs of the community and then attention should focus on the content required to meet the need. Only after that should the package (or actual container) be considered". Durrance (1989) also notes that the scope of the nature of information needs has expanded so significantly that research in the area has to consider both the cultural and organizational context of information seeking as well as information resources and information mechanisms, as appropriate focuses of research.

That information needs of users involve content and non-content aspects can also be traced in the literature related to research on relevance judgment, value of information, and repackaging of information content. In the literature on research into relevance, one can discern that users' needs are thought to be composed of both content and non-content aspects from what users use to judge the relevance of a given information content. In this literature, the criteria that users apply have been shown to relate to both content and non-content nature. While quite a number of authors have shown that both content and non-content related criteria are applied by users in judging relevance (Schamber, 1994), Barry and Schamber reflect well the understanding of information needs of users as content and non-content when judging relevance of information as follows:

The user criteria studies are based on the ideas that relevance judgments should be made by users who are motivated by their own information problem situations and that relevance judgments should take into account a variety of factors, including non-topical factors, that underlie simple accept-reject decisions (1998, p.221).

In particular the authors mention the term 'usability' which is defined as "the extent to which the source was easy to use, required little effort to operate or learn to operate, and presented no technical difficulties" (Barry and Schamber, 1998, p.229) as one of the non-content related criteria applied by users in judging the relevance of information. In the

context of e-journals, Pullinger (1999, p. 164) also discusses the importance of the non-content aspects of users' needs in relevance judgment when he says: "five years ago, it was primarily the content that needed to be agreed for relevance to the institution; now local factors are also key elements to consider in providing services". As the needs are what determine whether the information acquired is relevant or not, one can safely argue that it is the content and the non-content aspects of the original information needs that lead users to judge the relevance of information in terms of content and non-content related criteria.

In the literature related to the value of information, a number of writers observe that the value of information that users perceive comes from both the content and non-content aspects of information. The value of information is understood to arise as a consequence of being appropriate for the purpose that that information was sought initially (Taylor, 1986, p. 15). In the context of the value of information, Taylor (1986, p.13) discusses that these two aspects of information are responsible for the different values that users derive from information:

We must distinguish between two things:

- the value of the information content of messages, that is, the "meaning," that which informs or that which influences a decision;
- the value of the information resources ([that is], the services, technologies, and systems) that store, process, analyze, package, and deliver messages.

Westbrook (1997a) also indicates that the current trend in information needs research is such that scholars are now asking what aspects of information make it useful to or of value to or wanted by users. Similar questions are put forward by Badenoch et al. (1994, p. 40) as being important to determine the value of information to users: "One way is to ask: what do our users value? Is it ease of access? Is it repackaged information? Is it speed of delivery?". Badenoch et al. (1994, p. 56) further observe the role of content and non-content aspects of information in relation to the value attached to information: "This distinction implies that specific value is largely *content*-oriented, while generic value is at least partly system-, service or *conduit*-oriented". The treatment of the content and non-content aspects of information as being responsible for the different aspects of value is considered here as a reflection of users' needs as relating to content and non-content



aspects. As in the discussion by Taylor above, these writers acknowledge the need to address the non-content related aspects in order to meet users' needs properly.

The literature related to repackaging of information content, which is one of the major value-adding information activities in LIS, provides a strong argument that users' needs are not only content related. The underlying principle of repackaging is that information content has to reach the ultimate user in a form that is acceptable and usable for users to make any sense out of it (Boadi, 1987; Kularatne, 1997; Saracevic and Wood, 1981; Stilwell, 2001). The concept of repackaging recognizes that needed and retrieved information content could exist in a difficult-to-use form. In such cases, in order to enable users to resolve their problem situations, continued efforts are required on the part of the information workers to ensure that information content reaches the intended users in a convenient and acceptable form according to the users' situation and ability. This indicates that what it takes to meet users' information needs is not only the content aspect but also how the content is presented and accessed. The implications here are that form and level of presentation are important aspects of users' information needs and preferences. In line with this, Stilwell observes that the rationale behind repackaging is making information available to target users for whom the usual format used for conveying the information would pose a barrier (2001, p. 42). Stilwell (2001) further points out, among others, the activities of CABI which applies technologies, tools, and information transfer/delivery systems appropriate to the needs of the developing countries. This highlights that not only the content but also the form in which the content is delivered that must be appropriate to meet the needs of target users. Kularatne (1997, p. 120) also insists that "relevant information transferred from the developed world has to be repackaged and offered via a suitable medium to the target group if it is to be used for development" obviously because along side the content there are specific ways that such users need to have information presented.

In the electronic information environment, one can also find suggestions and indirect reference that users' needs relate to both the content and non-content aspects of information. Abels et. al. (1996, p. 147) assert that the adoption and use of electronic resources cannot be ensured unless the resources provide what is specifically needed by

the users. The needs according to the authors should be determined based on "appropriate data on requirements of faculty in different disciplines and different tasks; perception of accessibility and ease of use on the part of the campus community" among others. Dillon and Jul argue that "users must be able to identify, access, or obtain resources that are compatible with their computing environment" and "users must be able to interpret a wide variety of information formats"(1996, p. 203). Goldstein and Zack (1988, cited by Choo 1991, p. 54) maintain that the supply of useable information for the needed purpose to be composed of "the amount and type of data as well as the analytical tools that are made available". In their model, they indicate that the dimensions of the information supply and distribution in an organizational setting "would cover the availability of computer hardware (personal computer), software (databases, decision support tools), and the training and support needed to use them; the accessibility of the data; the number and type of information sources; and the currency and reliability of the data"(Choo, 1991, p. 54). This shows that what users need in an organizational context is composed of content and non-content aspects of information.

In addition, although they focus on an aspect of non-content that is not considered in this research, some writers indicate the existence of some non-content related needs such as affective needs. For instance, Wilson argues that "Because the situations in which information is sought and used are social situations, however, purely cognitive conceptions of information need are probably adequate for some research purposes in information science, but not for all. Information may also satisfy affective needs, such as the need for security, for achievement, or for dominance"(1981, p. 9). He further reflects this view when he says

What emerges from the Baltimore study is certainly compatible with the view presented in this paper but, again, information needs are presented in largely cognitive terms (although the existence of non-cognitive barriers is recognized) and the affective dimension of user's situation is lacking... In such a wider view the individual would be perceived not merely as driven to seek information for cognitive ends, but as living and working in social settings which create their own motivations to seek information to help satisfy largely affective needs (Wilson,1981, p. 10).



Similarly Schamber et al. note that users' needs incorporate affective aspects alongside the content or cognitive aspects. According to the authors information need "involves user's perception of gap or anomaly in his/her knowledge base that he or she may not be able to express adequately to IR system; involves user's values, expectations, and perceptions of situations and cannot be entirely resolved by topical content"(1990, p. 768). The works of Kuhlthau (1988, 1991, 1993) and Nahl (1998) and others (Nahl-Jakobovits and Jakobovits, 1985; Nahl and Tenopir, 1996) reflect the affective component of users' needs in different contexts.

Furthermore, as argued earlier, the bidimensionality of information that satisfies a given user's information needs, be it problem solving, decision making or others, is the reflection of the bidimensionality of the information need originally felt. In this connection, Belkin, Oddy and Brooks (1982, p. 65) argue that "It should be noticed that the problem determines not only the conceptual requirements of an appropriate response, but also the situational requirements such as, for instance, source of information, mode of information, etc.". Similarly, Taylor observes that "... there are many reasons, besides subject matter, why a message will be accepted or rejected ... That is to say, once we have ascertained with a fair degree of confidence the subject matter of a particular problem, the appropriateness or relevance of information displayed will depend on other attributes of the problem situation. The kinds of values grouped here [that is, under other attributes] respond to the concern with *how* something is needed, and *why*, and how well the system, including the human factors, can respond to the environment in which user operates" (1986, p. 65). He further notes that the other attributes, which are non-content related, are what the information systems contribute as being value added. He particularly mentions what he describes as "adaptability" (which is made up essentially of those measures provided by and investments made by the system which will strengthen the responsiveness of the system to problems that users have in their working/living environment) to be the feature of the system that addresses this aspect: "the idea of adaptability asks instead what dimensions of the problem are in non subject terms", and "attempts to match type of response with problem context" (Taylor, 1986, p.65).



Further in this line, and specifically in the electronic information environment, which is the interest of this research, a number of writers have indicated that what it takes to meet users' needs includes non-content aspect. Van Zijl (1998, p. 102) discusses usability with minimum user training, appropriate hardware and software availability and speed of retrieval to be among the criteria to be used in selecting electronic information resources so that users' needs are met in the electronic information environment. Content, relevance, usefulness, cost, and accessibility of electronic resources are some of the recommended criteria for the acquisition of such resources for users according LaGuardia and Bentley (1992). These again reflect the importance of paying attention to the different features of electronic information resources if they are to live up to their purposes, that is, meeting users' needs. LaGuardia and Bentley (1992) also stress the need for a "supplemental set of technology based criteria" in selecting electronic information resources if they are to meet the bidimensional users' needs. Johnson (1997, p. 95) lists further conditions and criteria specific to electronic information resources that have to be taken into consideration to ensure that the resources meet users' needs, which include: availability of network, hardware, and software resources; quality of interface, which includes ease of use for library users and staff; effectiveness and efficiency of retrieval or search engine; pricing considerations which may include number of simultaneous users; treatment of graphics, formula, and other non standard characters; support for information transfer, which includes support for file transfer protocols, downloading, and printing capabilities. Johnson earlier indicates that ease of use, access, and instruction (both to users and staff) are key decision components when selecting electronic resources, which will make them appropriate in resolving users' needs (1996, p. 11). Magrill and Corbin (1989, p.171) also include suitability of content; the extent to which a comparable print resources exists; compatibility with equipment owned by the library as important factors in selecting electronic resources. This is an indication that both content and non-content needs are what users experience in order to fulfil their gap in knowledge in electronic information environment.

Finally, some scholars have expressed the view that indiscriminate treatment of the different aspects of information needs has failed to contribute to, and been a source of confusion in understanding information needs for the purpose of informing information



system design and operation (Taylor, 1986; Rohde, 1986). For example, Rohde (1986, p. 52) recognizes the gross treatment of information needs, without discriminating between that of the content and the carriers, has been detrimental.

Although the above discussion attempts to draw attention to the recognition accorded in one form or another to information needs as being composed of content and non-content needs, this chapter emphasizes the argument raised in the early part of this section, namely that if information is composed of content and non-content aspects, then the need for information should always relate to these two aspects of information. If information that satisfies users' needs is accepted as a bidimensional entity then it is logical to argue that the information needs of users must be bidimensional in the first place. As Rohde (1986, p. 52) states, how one views information affects one's approach to the concept of information needs. Meeting needs means not only making the facts known to exist or making them available in some physical form but also making them available and accessible in appropriate and suitable ways to ensure that they are acquired, perceived and assimilated by the user to fill the felt knowledge gap. This meeting of the information needs can happen not only with existence of a piece of fact or data and the awareness of that but also of other factors that actually make the facts accessible, usable, and acceptable when delivered. To be accessed and perceived the facts have to be accessible with the existing carriers in each setting. As Horne (1975, p. 34) succinctly puts it: "When the user needs information: it must be accessible and available to him; it must be relevant, reliable and timely; it must be in a readily usable form; it must be at a cost he is able to afford or better, free". While the need for specific facts, figures, and advice constitutes the content aspects of information needs, the need for suitable presentation of the content constitutes the non-content aspect of information needs of users. As indicated earlier, the need for suitable presentation of content is considered as a non-content or carrier related need because it arises in connection with the capability of the prevailing carriers and user skills in accessing and using the carriers and the content therein. Therefore, in this research information needs are viewed as composed of both content and non-content aspects inseparably. This is because both aspects are needed at the same time in order to fill in the gap in users' knowledge which they experience when dealing with their environment.



In addition to understanding that information needs are composed of content and non-content aspects, this research recognizes most of the assumptions regarding the nature of information needs of users as reflected by the user-oriented view. However, in this research, the nature of information needs as reflected by the user-oriented view in chapter two are considered to relate particularly to what is referred to here as content related information needs. In other words, in this research the content needs of users are recognized as subjective, cognitive, situational, dynamic and non-specifiable by users as argued by the proponents of the user-oriented view.

Furthermore, this research emphasizes the following implications of these assumptions as important in the alternative conceptualization. The first implication relates to the non-specifiability of information needs by users. As pointed out in chapter two of this thesis, in general users have difficulty in initially understanding and articulating their information needs. Therefore, when required to express their needs, users are actually being asked to express something they do not understand by and large, at least during much of the early phase of their realization of their gap. Information needs have to be understood in the first place in order to be communicated precisely between users on the one hand and the information professionals and information systems on the other. Adding to this, there is also a problem of articulating information needs by users even when there exists some understanding of the needs. The research points out that what users say about their information needs has to be received with caution. In other words, in the effort to study the information needs of users, what researchers face is the difficult task of identifying an entity from information supplied by users which is difficult to be understood fully and expressed by the users themselves. This is viewed by this research as one major characteristic feature of the information needs of users that has to be taken into account in developing a sound conceptualization and methodological approach in the area. It has been confirmed that by not considering the difficulty users have in understanding and expressing their information needs in the design of information retrieval systems, such systems have failed to realize their potential fully (Belkin, Oddy and Brooks, 1982, p. 64; Schamber, Eisenberg and Nilan, 1990, p. 758).



The second implication relates to the dynamic nature of information needs. As shown in chapter two, the information needs of users are dynamic in that they change as a result of the interaction with potentially relevant information sources. The interaction helps users gain clearer picture of their gap in knowledge and what information content will fill it. Consequently every time we ask users to describe their information needs, even if they understand them fully, what they can identify at a given point in time can give only a part of their information needs. What can be grasped by users is a part of their information needs which is at some specific point in the process of evolving. Accordingly, what can be traced at some specific point during IR interaction or a reference interview or information needs assessment surveys is just a snapshot of users' information needs and is largely soon-to-be replaced in one form or another. In other words an incomplete picture is what users have and hence what researchers learn from users most of the time. What users perceive as an information need at one point, as well as what researchers learn from users, might not be the real one or might not give a complete picture of users' information needs. The point here is that as a dynamic phenomenon it is difficult to pinpoint and have a static picture and description of the information needs of users. Therefore, research focuses and methodological approaches in information needs research have to reflect and accommodate the dynamic characteristics of the information needs of users. In this connection, methodological approaches that allow one to determine the actual information needs of users and system features that facilitate users in realizing their information needs fully, are critical. Furthermore to enable the determination of the ever-evolving information needs of users, studies on information needs should be conducted on a continuous basis. However, conducting such studies as frequently and extensively as required would be impractical as it would be too expensive in terms of time, resources, and skills (Nicholas, 1996). As a result the need for having an affordable yet valid means of learning information needs of users is obvious. A number of writers have called for a similar means of finding out about the needs of users. Nicholas stresses the need for a usable and repeatable method of analyzing the information needs of users that can be employed by all concerned (1996, p. 4). Kaniki (1995a, p. 11) also argues that "What is required are suitable, usable, and easily adaptable instruments". The consequences of failing to recognize the dynamic nature of

the information needs of users has been observed by some writers. Schamber, Eisenberg and Nilan (1990, p. 772) note that "By not taking these dynamic aspects into account, earlier "snapshot" studies may have failed to assess the full effect of the process of information retrieval on users". Froehlich (1994, p. 128) also argues that because information needs evolve or are dynamic "oftentimes, even if they are instructed to do otherwise when end-users judge output, they use their current information need, not what they said they needed previously".

The third implication relates to the assumption that information needs are cognitive. It is shown that information needs occur in the minds of the individual who experience them. Consequently, information needs of users are not directly observable by others. This requires that researchers should come up with a methodology to identify and describe something that is not observable to them in any physical sense.

### **3.4 Definition of the physical form of information and related assumptions**

Another core assumption emphasized in this research is that the physical form in which information content is made available for users influences their information needs. If the assumptions that information always exists as content and non-content in an inseparable way and that information needs always occur as related to content and non-content aspects in an inseparable fashion are accepted, then what follows according to this research is that the physical form or the carriers in which information content is made available influences the the information needs of users. In other words, the understanding that the non-content needs or the carrier related needs are one of the constituting aspects of information needs indicates that the physical form in which content is made available for users' access and use influences their information needs. Similarly, information environments, namely, the print and electronic information environments, influence the information needs of users. This is because the print and electronic information environments are essentially determined by the nature of the physical forms or carriers in which facts, figures, and concepts are made available for users' access and use. The electronic information environment is distinguished by its use of electronic information



carriers to capture, store, process, retrieve, and exchange information content. The purpose of this section is, thus, to re-emphasize the importance and the nature of non-content or carrier related needs. By doing so the discussion throws more light on importance and nature of non-content needs. The discussion is also intended to show that there are supporting arguments in the literature of LIS that point out that physical forms of information influence information needs. According to this research, however, it is argued that physical forms influence information needs by specifically determining the non-content aspect of information needs. Re-emphasizing any content-related needs is unwarranted here as content needs remain the same in different information environments or irrespective of the physical form in which relevant content is made available. The physical forms implied here are the carriers of the print and the electronic forms in which information content is made available for access and use. As pointed out earlier, carriers refer to information sources and channels in which information content is stored, processed, retrieved, and exchanged. The print and electronic carriers are the principal physical forms in which information content exists for users' access and use. The two physical forms are the basis for the print and electronic information environments referred to throughout this thesis. The argument that the physical form in which information content exists for users' access and use influences users's information needs is elaborated below.

As pointed out earlier in this chapter, information needs are composed of content and non-content needs. It has also been argued that the non-content or carrier related needs arise in relation to the carriers in which information content resides. As mentioned above, the carriers of the two physical forms, namely the print and electronic, are where content is stored and accessed. Consequently, the physical form on which the nature of non-content needs largely depends is one of the two contributing factors determining the nature of information needs of users. The physical form in which information content resides leads to distinct carrier-related needs because the state of the carriers of each physical form in a given setting constrains users of that setting to require the contents be made in a particular way. More specifically, the capabilities of the carriers of a given physical form influence users to need contents in that form to be made available in a way



that accessing and using the content is possible within the limits of the capabilities of the carriers. For example, the capabilities of the electronic carriers that users of a given setting currently enjoy constrain the users to need the content in electronic form to be made available to them in such a way that accessing and using the contents within the limits of the capabilities of their electronic carriers is possible. Depending on the abilities of a user in relation to access and use of the contents in the carriers of a given physical form, he/she exhibits particular preference or choices regarding how the relevant content is made available so that access and use of the content in the carriers is possible within his/her abilities. In this way the physical form in which information content is made available generates specific carrier related needs. Such needs are non-content or carrier related because they stem from the prevailing state and nature of the carriers in each setting as well as users' levels of skills to manipulate existing carriers. Capabilities of carriers are the capacities that carriers provide users for accessing and using the content residing in them. These capacities are the function of the carriers' storage, processing, and transmission capacities. The non-content needs are determined not only by the prevailing capability of the carriers in use, but also by the level of skills that users possess for making use of the carriers. As has been argued earlier in this section, in order to resolve their gaps in knowledge, users need the relevant content to be made available in such a way that it is accessible and usable within their abilities. Users' abilities in connection with the carriers of a given form encompasses the capabilities that the prevailing carriers provide and the users' skills in making use of the carriers.

Due to the fact that users' abilities with respect to access and use of information content in different physical forms vary, users of a given setting will have varying information needs with varying requirements of the physical form in which information content of interest exists for their access and use. Users' needs when their information content of interest is made available in print form vary from their needs if the same information content is made available for their access and use in electronic form. The reason for the difference in the information needs of users when presented with different physical forms of information is that the aspect of users needs which arise in relation to carriers are different for different physical forms. Users' abilities for accessing and using carriers of



print form are obviously different from their abilities for accessing and using carriers of electronic form in a given setting. For example, a given individual's level of skills in accessing and using information content in print information sources will be different from that of accessing and using electronic based information sources. The skills required for accessing and using print based sources are different from skills required to do the same with electronic based information sources. The carriers in electronic form are distinctly different from the carriers in print form. The carriers in electronic form consists of the electronic channels and sources such as the computer and electronic databases, while the carriers of print form involve print sources such as printed books.

Similarly, users of different settings will have different needs even when their information contents are presented in carriers of similar form. This is because first, the capabilities of the carriers of a given physical form obviously vary from one setting to another, and second the abilities of users in accessing and using contents in the carriers of a given physical form vary. It is unlikely that two settings will be identical in terms of the quality, quantity, and accessibility state of their electronic carriers to access the electronic information content and the skills of their users in accessing and using the carriers. It is logical to argue that the capabilities of the computer systems or the network infrastructure that are needed to access and use electronic information content such as that in a remote database vary from one setting to another. Similarly the users' personal abilities in interacting with carriers of the same form will vary for different reasons. Type and level of training that one has received in accessing and using electronic carriers are some of the reasons. Thus, users of different settings will have differing information needs arising from the differing states of capabilities of their carriers of a given form and from the users' skill in interacting with the carriers. Depending on their prevailing abilities, users of each setting require the information content of interest to be made available in a unique way. This constitutes the nature of the non-content needs which will be reflected in the overall nature of the information needs of users in each setting.

There are discussions in the literature of LIS that directly or indirectly indicate that the physical form affects users' needs. Some of these discussions are presented below.

McCreadie and Rice (1999, p. 63 ) state that "... The form in which information is displayed or exchanged must also match the needs of the potential user for access to occur. Browsing for information, for example, requires that the potential source of information be on display in some manner for scanning or consideration by the potential user ... Similarly, the medium must match the physical abilities of the user, so that if the user is unable to see, then print is an inappropriate physical display of the information". This primarily indicates that there are users' needs which are related to how the content is made available for users' access and use. This indicates that meeting users' needs depends not only on the availability of relevant contents but also on how these are physically presented. It further shows that users experience a need specifically for a particular way of presentation and accessing depending on their prevailing abilities. Similarly, Buckland (1991, p. 79) argues that if information sources containing relevant content are not "made physically available in an acceptable fashion, then another source needs to be identified and made available". This view points out that there are specific acceptable ways in which carriers have to be made available to each individual user in order for the user to resolve felt gaps in knowledge. Barker (1998, p. 192) comments that "Naturally people's abilities with respect to reading and writing skills will vary considerably depending upon their innate characteristics and their experience. Their abilities will also depend upon the nature of the media involved". This view supports the idea that users' skill in using carriers of print form varies from that of the electronic form. The comment also points out the idea that users' abilities vary in accessing and using the same carriers. As argued earlier in this thesis, depending on their abilities in accessing and using the carriers of each physical form, users will experience non-content related needs.

Furthermore, Abels, Liebscher and Denman (1996) and Liebscher, Abels and Denman (1997) remark that there are expectations that the electronic networks will strongly influence the information needs of users. This remark implies that because of a change in the nature of carriers in which information content is made available to users, a change in the information needs of users is bound to occur. More specifically, the remark suggests that the emergence of carriers of the electronic form such as the electronic networks for



information access and use are bound to change the nature of information needs of users who are going to use the carriers. Palmquist and Kim's (1998, p.3) observation that users' needs are changing in the current electronic environment further illustrates the contribution that physical form has in the nature of users' information needs: "Instead of being provided with traditional storage and retrieval tools, [that is], book stacks, card catalogues, journal indexes, interlibrary loans, or even mediated database searching, our users are now confronted with issues such as connectivity, unfriendly or dissimilar user interfaces, and information overload. Their need for value-added content is still the same, yet the container and the conduit have added a layer of complexity". This comment statement argues that because of change in the nature of the carrier, from print to electronic, the nature of users' needs is affected.

On the other hand, some writers argue that physical form and content work together when one talks about addressing information needs of users. Although indirectly, this view is considered in this research as supporting the view that physical form affects users' information needs. This is so because the writers are implying that physical form is also responsible for creating the original need the meeting of which, it is contributing towards. In this connection, Downs and Friedman (1999, p.283) argue that both the physical form and content of information resources support the information query process and that both the physical form and content influence comprehension. A similar view can also be noted from the following observation: "It is important to recognize that form does shape content to a certain extent and that consequently, 'print yields a particular kind of discourse'...Electronic form of information will also shape discourse, and it is the role of content specialists to mediate between these different discourses in order to make sure that users have access to the appropriate forms of discourse for the particular discipline" (Budd and Harloe, 1997, pp. 22-23). This view primarily shows that the physical form is a part of the consideration in meeting users' needs for facts, figures and opinion.

In the literature related to relevance research, users' judgment of the relevance of information is also shown to be affected by the physical form. This is considered in this

research as an indicator that users have particular needs in relation to physical form in which information content is presented. For example, Barry and Schamber (1998, p. 228) observe that "It is evident that respondents in both studies mentioned the sources of information as one factor affecting their evaluations of information". The case is further argued in the comparison made of users' assessment of relevance between that of the Barry and Schamber studies:

Schamber's summary category of dynamism and the subcategories (Interactivity, Tracking/Projection, and Zooming) all pertain to the extent to which the presentation of information was dynamic or live, and the extent to which respondents could manipulate the presentation of information. Again, it seems obvious that such factors would not be mentioned by respondents in Barry's study, simply because they were restricted to the examination of printed documents that were not interactive and that the respondents could not manipulate to change the presentation of information... Schamber's summary category of presentation quality and the remaining subcategories (Human Quality, Nonweather Information, Permanence, Presentation Preference, and Choice of Format) are not reflected in Barry's categories. Again, the explanation for these variations seem to directly relate to the fact that Schamber's respondents were using sources that could be manipulated in some way and sources that varied greatly in terms of information presentation. ...Presentation Quality refers to the extent to which the source presents information in a certain format or style... The format of information presented by a radio station... and computerized weather information system would vary greatly, and that this variation might influence the respondent's perception of utility of the information. Two subcategories, Presentation Preference and Choice of Format, are closely related to this concept that respondents could manipulate the presentation of formats and could prefer some formats over others (Barry and Schamber, 1998, p. 233).

Schamber, Eisenberg and Nilan (1990, p. 773) also point out the role of physical form as follows: "The matter [relevance research] is further complicated by considerations of different kinds of documents and systems ([for example], text, image, multimedia) and by different information need situations and information use environments". Thus, with differing physical forms, what users use to judge information (composed of content and non-content) in meeting their needs varies. And this according to this research is a reflection of the original need which is also shaped by the physical form in which information is made available for access and use.



Finally, although not stating clearly how, some writers argue that the range of information available influences the information needs of users at different times (Bouazza,1989; Ford, 1977; Hanson, 1964; Lin and Garvey,1972; Paisley,1968 ). From the point of view of information and information needs in this research, the influence of the available information for users access and use should relate to both its content and non-content. Furthermore, it is the view of this research that the influence that these writers have observed has arisen more from the carrier than from the content. This is the case because users' content needs arise from problem situations that users encounter and how much they know about the problem situations to address them. This happens irrespective of the available information for users' access and use. The content needs occur before the need related to carriers come into the picture. The content needs occur irrespective of the available information. It is the carrier- related needs that arise in relation to the nature of the existing carriers containing the potentially relevant information content in each setting. It is then the carrier related needs that are said to be influenced by the available information for users' access and use. All in all, the above writers' views are important in that at least they recognize that users experience needs in relation to how information is made available for users' access and use.

The main implication of the above observations and the argument that users' ultimate needs vary with varying physical forms of presentation is that one has to specify with which physical form one is discussing users' needs. One is required to specify which physical form of information, that is, print or electronic, that one is referring to when addressing users' needs. In other words, there is a need to qualify our reference to users' needs through the distinct physical form in the context of which the need is being discussed. As shown above, users' needs in the electronic context are different from those in the print context and this requires to be clarified for better discussion of users' information needs. This could be achieved by referring to users' needs with qualifying terms representing the physical form contexts such as 'electronic information needs' or 'print information needs as appropriate'.

It is important to stress here that the physical form or the carrier specifically influences the non-content or carrier related needs of users. In other words, what differentiates the information needs of users in the electronic information environment from that of the print information environments are the carrier related needs of users. As Palmquist and Kim (1998) pointed out, the content related needs of users are the same in both the print and electronic information environments. It is the needs arising as a result of differences in the nature of the carriers of the print and electronic information environments that lead to differences in the overall nature of users' needs in different information environments. As indicated earlier, in this research the electronic carriers are the basis for electronic information environment. Print information environment, on the other hand, is information use environment where the carrier and the content are in print form. The difference in information needs of users between these two information environments is attributed basically to the physical carriers in which information content is made available for users' access and use.

### **3.5 Definition of the electronic information environment and related assumptions**

One of the assumptions adopted in this research for the proper understanding of the model relates to the electronic information environment. In this research, the electronic information environment is taken to mean where information content is made available in electronic form for users' access and use. It is an environment where users seek and acquire information content of desire from electronic carriers.

Information content has been provided in print form for centuries, where the first book was published in the 15<sup>th</sup> century (Feather, 2000). However, in the past few decades information content has also started to appear in electronic form for users' access and use. Some of the content that used to exist in print form and new content are now made available in electronic form. Currently, the development of the electronic information environment is one of the central issues of the literature of LIS. Meadows states that "Any reading of the world press, let alone of library and information sources, makes it clear that the transition from traditional communication channels to digital channels



dominates current discussion of information” (1999, p. 1). Many writers also observe that the electronic information environment is growing fast (Arms, 2000; Barker, 1997; Ding Choo Ming, 2000).

Although electronic information refers to wherever information content is to be accessed and used in electronic form, the library and information systems are the dominant aspects of it (Barker, 1997; Borgman, 1999; Oppenheim and Smithson, 1999). Libraries remain focal points as they will continue in organizing and facilitating access to electronic information from variety of electronic information sources and systems. Library and information systems have always been units whose primary purposes are identifying, acquiring, processing, organizing, storing, archiving, disseminating and facilitating access and use of information content in a variety of forms. They are units usually established to serve primarily a given user constituency. They normally provide the equipment and facilities as well the human expertise needed by their users to access and use the information content stored in them or accessible through them. Thus, although an electronic information environment can exist without a library and information system providing the electronic information sources and channels, library and information systems remain the focal point of information acquisition, organization, and access to many users.

The electronic information environment has a number of features that distinguish it from other information environments, namely the print or the oral environments. For the purpose of this thesis, the features can be organized under information carriers in use, user skills required and unique advantages of the environment. Each of these are discussed below.

### **3.5.1 Carriers in use and related requirements in the electronic information environment**

The electronic information environment uses electronic carriers. In this research, electronic carriers are electronic information sources and channels or supporting

technologies. Electronic information sources are those information sources which use electronic media to store their information content. The electronic media include magnetic tapes, magnetic disks, and optical disks (Barker, 1998). Electronic information sources are available in the form of CD-ROMs and online databases. Examples of electronic information sources include bibliographic indexes, library catalogues, e-journals, e-books and reference materials, and others such as data sets, image files, and public domain content on the Internet. Content from listservs and discussion groups are also considered as important electronic information sources by many professionals these days.

Computer and computer-based networks are the main tools channeling information content from electronic information sources. Channels in this research refer to the means of delivery of information content from electronic information sources. The channels here specifically refer to the supporting electronic technologies. They are channels because they do not contain the content but are necessary to facilitate access and delivery of the electronic content residing in the electronic information sources.

Consequently, for access to and use of electronic content, the electronic information environment is dependent on a number of types of specific and general purpose electronic equipment and facilities (Arms, 2000; Baker and Shrode, 1999; Barker, 1998; Ding Choo Ming, 2000; Hurd, 2000; Johnson, 1997; Jones, 1999; Meadows, 1999; Palmquist and Kim, 1998; Van Zijl, 1998). Broadly, the resources required consist of computer hardware, networking hardware, and interfaces. Different writers discuss these requirement mostly in the context of electronic collection development. Some of these writers attempt to list of the required resources while others focus particularly on one or two of the requirements as the paragraphs below will try to show.

Johnson identifies the following resources as prerequisite to provide access and use of electronic information content in electronic information environment:

- Network, hardware, and software compatibility, plus compliance with industry standards
- Availability of network, hardware, and software resources and cost



- implications
- Availability of electrical and telecommunication lines and cost implications
- Quality interface, which includes ease of use for library staff and user
- Effectiveness and efficiency of retrieval or search engine
- Training implications for staff and patrons (1997, p. 95).

Jones (Daniel Jones, 1999, p. 28) notes that

... when selecting electronic resources it is essential to know if the library has the technical resources required to support it. Thus, additional factors must be determined such as computer platform and operating system, initial storage capacity and rate of growth, requirements for client software or other software necessary to manage the product, frequency of update, network capability, user interface, medium in which it is distributed, pricing options, maintenance costs, user limitations (stand-alone, single- or multi-user), site limitations, etc.

Jones adds that the number and availability of appropriately configured user workstations to provide access to electronic information resources is another aspect of resources required in the electronic information environment. Hurd (2000, p.78) notes that electronic products require additional technological infrastructure and upgraded skills among the staff. Baker and Shrode (1999, p. 160) also point out that to decide the right mix of electronic resources to acquire, one has to first determine the libraries' capabilities by assessing the library infrastructure and technical capacity with respect to providing electronic resources.

Barker (1998, p. 195) notes that delivery of electronic documents are platform dependent in that they require availability of compatible software and hardware. Barker comments that

Usually network publication ...enhances the ease with which a document can be obtained. However, that document may not be understandable unless an appropriate "reader software" facility is available to 'decode it'. Increasingly, with respect to network publication, 'standard' browser are now being employed for document access and reading. These are normally augmented by various 'helper' applications and 'plugins' in situations where these are necessary. Usually, the nature of the reader software that is employed will depend upon the type of authoring tool that has been used to create a document (1998, pp. 194-195).

Barker also points out the need for high speed printers and appropriate computer screen facilities for the display of electronic information content (1997, p. 130).

With regard to interface requirements, Ding Choo Ming notes that "Following the proliferation of digital information via interconnected networks, it is vital to develop search engines and user interfaces to facilitate the identification, selection, retrieval and delivery of needed information to users cost effectively and the form and medium preferred." (2000, p. 29). To access and use all types of electronic content, therefore, adequate availability and accessibility of the required equipment and facilities are prerequisite.

Due to practical reasons, the electronic equipment and facilities are not usually available at the ideal level to users. For example, the high rate of development of electronic technology makes it difficult for any institution or individual to keep up to date in terms of acquisition of the required equipment and facilities. The technological change is so fast that one may not be able to use the current developments before they are superceded by yet new ones. The cost of keeping up to date is also too high for almost everyone. As Meadows (1999, p. 5) indicates it is hardly possible for users to have the ideal level of electronic equipment and facilities. The quality of equipment and facilities available in each setting also varies for reasons like level of financial resources available to each institution or individual. Effective access to the technology market and policies also limits the nature of electronic carriers that an individual or institution can have. As a result of this fast change in electronic technology and other factors mentioned above, individuals and organizations usually have access to differing qualities of electronic equipment and facilities. In this connection, Arms (2000, p. 12) points out that

the quality of the technology available to users varies greatly. A favoured few have the latest personal computers on their desks, with high-speed connections to the Internet and the most recent release of software; they are supported by skilled staff who can configure and tune the equipment, solve problems, and keep the software up to date. Most people, however, make do with less. Their equipment may be old, their software out of date, their Internet connection troublesome, and the members of their technical support staff undertrained and overworked. One of the great challenges of



in developing digital libraries is to build systems that take advantage of modern technology yet perform adequately in-less-than-perfect situations.

Arms also points out that the Internet is far from being conveniently accessible from everywhere because in some places equipment and communication costs are high and support infrastructure lacking (2000, p. 12). Ding Choo Ming (2000, p. 26) expresses a similar view when he states that "In this networked environment, the accessibility of digital information differs among libraries as well as among individual end-users. These differences are attributed to factors such as the availability of the required hardware, personnel, types of data organization and the users' ability to identify, select, retrieve and navigate; as well as the libraries' role in creating awareness, facilitating access and stimulating the use of digital information". The state of quality of electronic equipment and facilities available in each setting influences the nature of services and products that could possibly be provided to users in each setting. As will be argued in later chapters of this thesis, the level of availability and accessibility of the electronic equipment and facilities also lead users of each setting to experience specific carrier related needs. Setting is further discussed later in this chapter.

### **3.5.2 User skills required in the electronic information environment**

Since the tools for accessing and using content in an electronic information environment are unique and in a fast state of change, users in an electronic information environment need to have specific skills for accessing and using electronic carriers. The nature of the electronic carriers has led to the dominance of end-user accessing and using information in the electronic information environment. The technological developments have also made it possible for users to interact directly with existing electronic information sources and services. This end-user accessing and using depends on users' level of skills in dealing with the electronic carriers and the content therein.

Many writers stress the importance of end-user training in the electronic information environment (Baker and Shrode, 1999; Ding Choo Ming, 2000; Jones, 1999; McCreadie and Rice, 1999; Probst, Raub and Romhardt, 2000). For example, Ding Choo Ming

argues that “the richest online information is not beneficial to end-users unless they know what resources are available and how to extract the required information from the appropriate resources” (2000, p. 26). Ding Choo Ming further comments that

Though the technology of hyperlinks allows meta-searching, which in turn provides new, efficient, intelligent and instant access to digital information, we should be well-versed in information gathering skills and search techniques; this brings us to the problem of user training. The general feeling is that technical training may be less ‘needed’ for the frequent users who are already familiar with electronic information. Nevertheless, electronic resources demand different search techniques, strategies and skills as compared to their print counterpart. Hence user training is particularly important when new and better systems come into the market or when new and complex interfaces for the existing systems need to be implemented. To become efficient and effective searchers, we need training to sharpen our search capabilities. This is because Internet searching depends a great deal too on our ability to specifically identify query terms. Similarly, effective keyword searching depends very much on how precise the terms are that we use (2000, p. 29).

Therefore, an adequate level of users’ skills in interacting with electronic carriers existing in their setting is the other unique requirement of the electronic information environment.

Implied by the writers above is that there is a continuous need for user training in the access and use of electronic carriers. However, getting training which will keep up with the technological change is not possible to all. Consequently users are found with different levels of skills and experience in interacting with electronic information carriers and the content therein. This partly influences what kind of content each user is capable of accessing and using.

### **3.5.3 Unique advantages of the electronic information environment**

Many writers bring to attention a number of unique advantages and potentials that electronic carriers have to offer (Arms, 2000; Barker, 1998; Ding Choo Ming, 2000; Griffin, 1997; Hurd, 2000; Jones, 1999; Meadows, 1999; Oppenheim and Smithson, 1999; Starkweather and Wallin, 1999). These advantages primarily relate to storage of



and access to information content. The advantages of the electronic information environment come from both the sources or the media and the channels or the supporting technologies.

In relation to storage, it is shown that electronic information sources bring about considerable reduction in physical storage space; allow one to store different kinds of content, such as text, pictures, animations, audio, video, and a combination of these; allow one to store large amounts and variety of data in a small space and in an easily interactive manner; and provide high physical security of stored data (Arms, 2000; Ding Choo Ming, 2000; Jones, 1999; Marchionini, 1998; Oppenheim and Smithson, 1999). According to Oppenheim and Smithson (1999, p. 97), for example, the benefits of the digital library include “the reduction in the physical storage of information; less wear and tear of objects; the ability for several people to view the same item at the same time; the ability to view the contents in the home, office or other non-library locations, and the potential for increased cost-effectiveness”.

With regard to access to information content, it is shown by many writers that electronic carriers provide unprecedented access to information content residing in them. Accordingly, electronic carriers allow simultaneous access to the same content; non-linear access to electronic content; direct and instant access to remotely located electronic content; access to content of a text, sound, and video nature and a combination of these; interactive access through browsing, linking, and modifying electronic content from different source documents; and fast and accurate retrieval of facts and concepts from content in its electronic form (Arms, 2000; Ding Choo Ming, 2000; Griffin, 1997; Jones, 1999; Marchionini, 1998; Oppenheim and Smithson, 1999). In this connection Ding Choo Ming notes that

In the wake of advances in computer technology, sophisticated indexing techniques and bibliographical control, digital information can be retrieved in a variety of ways. We can browse, scan and can also perform relevance ranking, keyword searching, automated highlighting, thematic thread-following, Boolean searching, concept searching and natural language searching which encourages ‘just type in whatever might relate

to what you are looking for'. With the multiple access mechanisms facility, we can navigate seamlessly in the ever growing ocean of electronic information on the Internet or WWW (2000, p. 28).

Ding Choo Ming further notes that "The Internet is known not only because it has enormous capacity for storing and accessing information, but also because it integrates text, pictures, sound and video in a user-friendly manner. It is desirable too because it enables us to search external library databases and allows rapid information retrieval" (Ding Choo Ming, 2000, p. 31).

Griffin also comments that

Digital documents can be searched, reorganized, annotated, linked to others, shared, etc. The content, structure and formats of documents can be treated independently to greatly expand functionality. In large collections, this adds new dimensions of usability... Documents can present different views for different audiences. A simple version of a document meant for browsing by general audiences might be expanded on-demand to provide enough additional detail, background and context to satisfy serious researchers in the field. A single document might contain text, images, video clips, maps, lexicons, and additions and annotations provided by new 'authors' contributing to the work (1997, p. 136).

These new features distinguish the electronic information environment from any other before it.

In conclusion, the electronic information environment is where users have to access their content of desire in electronic form. It is unique in terms of the carriers it requires, the skills that its users need to have, and its features and facilities for storage and access to information content.

### **3.6 Definition of Information use setting and related assumptions**

Another important consideration taken into account in this research is the uniqueness of the information needs of users in each setting. Information users in every distinct physical setting experience unique information needs as information needs arise from the setting in which users live and work. The rationale behind this view is that each setting is



unique in terms of the concerns, problems, activities, and tasks which lead to unique problem situations, and hence the corresponding information content needs. Furthermore, to this research, specific features of each setting in terms of capabilities in facilitating access and use of the information carrier lead to specific carrier related needs in each setting. The capabilities of the setting that are being referred to here are the technological supports associated with accessing and using content from information sources. In the electronic information environment, the computing facilities are the main technological supports, for example. The possibilities of overlap among settings in terms of problem situations and capabilities, and hence information needs, are there, however.

‘Setting’ here is treated in the sense that Taylor (1986, pp. 34-35) defines information use environment (IUE):

... the set of those elements that (a) affect the flow and use of information messages into, within, and out of any definable entity or group of clients; and (b) determine the criteria by which the value of information messages will be judged in those context... There are three general types of information use environments.

*Geographic:* defined by some physical limit, for example, a neighborhood, a city, a region, or a nation. The neighborhood as a definable entity is probably the only one that is meaningful at this time in the value-added context. The local public library and local social agencies (basically information processes) have a concept of information need and use that fits well in the value-added approach. Larger geographical entities, such as a city or country, may be useful for inventorying information resources, but they have little meaning in our context until we can analyze at the local level and then perhaps aggregate.

*Organizational:* An organization is a complex social unit deliberately designed to achieve a specific purpose or set of purposes (Knight & McDaniel, 1979; p.5). In this context, an organization may be part of a larger organization, such as a research and development division of a corporation, or the financial and accounting section of a public agency. It may be a real estate office, a hospital, a police department, or a consulting firm. In each case it meets the criteria of the initial definition.

*Social/intellectual/cultural:* a group of people, very possibly unknown to each other, whose professional or personal interests provide a basis for various kinds of information services and products. At the social level, examples are: all Masons, all Catholics, all stamp collectors; at the intellectual level: all Chicanos, all chamber music players, and so forth.

A number of authors have brought to light the perspective that the specific setting in which users live and work determines the information needs of users. According to Taylor (1991), information needs arise from the environment in that each of the definable IUE has a discrete class of problems, spawned by its particular setting and by the exigencies of its profession, occupation, or life style. He further points out that such features as the nature and attributes of settings, the types and structures of information and the means of dissemination of information in the settings, the physical context in general, in which people usually work and live influence their information needs and how they seek and use information. In his earlier book, Taylor (1986, p. 15) argues along the same lines saying that "Clients or sets of clients live and work in particular environments. It is from this environment that tasks and problems are generated". He further stresses the uniqueness of each environment in informational sense: "The structure of the environment, in many complex ways, determines what information is acceptable ([that is], has value) for clarification, solution, or alteration of a problem, or for the accomplishment of a task. A message then is given value by a "user" who sees its potential "usefulness" because he or she is in a particular environment and can relate the message to the problems and tasks of that environment". In the same way, Durrance maintains that "Information needs vary according to the nature of the activity in which the end user is engaged, the setting in which the activities take place, and the personal characteristics of the user" (1989, p.127).

Wilson's view further shows how inclusive the elements of the setting that influence the information needs of users could be

Again, the search for determining factors related to needs and information-seeking behaviour must be broadened to include aspects of the environment within which the work-role is performed. The immediate work-environment and its 'climate' has been mentioned above, but the socio-cultural environment, and the physical environment will all have an impact in particular ways. The relationships will be too numerous to detail here, but examples can be given:

- the economic climate and the differential stratification of resources will define some work environments as 'information-poor' and others as 'information-rich', with consequent effects upon the probability of information-seeking behaviour and the choice of channel of communication;
- the political system may define certain types of information



forbidden to particular groups (including the general public) and, consequently, the non-availability of this material may affect performance in specific work roles;

- the physical environment will have a clear effect upon the nature of some categories of tasks and upon the consequent cognitive needs. For example, questions emerging out of drilling for oil in the North Sea are likely to differ in many cases from those that emerge out of drilling in Saudi Arabia (1981, p.10).

According to Krikelas "Studies of general publics, as well as those focusing on special audience ([for example], blue collar workers, scientists, academic librarians, engineers, historians, and others) have demonstrated that the setting in which a person works (or lives) has a great influence on defining needs" (1983, p. 10). Finally, Nicholas (1996, p. 3) simply states that "It is in the office and home that information needs are hatched". The view that information needs are influenced by the setting in which users work and live is advocated by other writers as well (Marchionini, 1995; Paisley, 1968; Reneker, 1993). The setting is also pointed out to be one of the factors that influences users' acceptance or suppression of their information needs (Marchionini, 1995, p. 51).

In related discussion, some authors specifically argue that the basic needs of human beings give rise to information needs of users. The basic human needs referred to by these writers are physiological needs, such as the need for food and shelter; psychological needs, such as the need for domination and security; and cognitive needs, such as the need to plan and learn skills (Nicholas, 1997; Wilson, 1981). This again is in line with the uniqueness of the information needs of users of each setting because the basic needs are felt uniquely in each setting mainly depending on the stage of economic, social, and technological development enjoyed in each setting. According to Wilson's (1999) information behavior model, for example, information needs arise in relation to the basic needs that occur in the setting to which users belong. And he adds that the context of any one of these basic needs may be the person him- or herself, or the role demands of the person's work or life, or the setting (political, economic, technological, etc.) within which that life or work takes place. In his earlier writing, Wilson also argues that "...when we talk of users' 'information needs' we should not have in mind some conception of a fundamental, innate, cognitive or emotional 'need' for information, but a

conception of information (facts, data, opinion, advice) as one means towards the end of satisfying such fundamental needs"(1981, p. 10). Nicholas (1996, p. 7) and Hjørland (1997, p. 160) also reflect that the basic needs are behind information needs that users experience.

In the electronic information environment the role of the setting is well recognized as presented by Marchionini (1995). According to Marchionini (1995, p. 32) "The setting is the situational and physical context for information seeking", and embraces a wide range of factors in the information seeking process of users:

The physical setting determines physical constraints such as the amount of time allocated, physical accessibility, comfort, degree of distraction, and cost. It makes a considerable difference whether one is seeking information in a private office or in a public place with a line of impatient people nearby. Physical features such as lighting requirements for paper and electricity and hardware for electronic information are often assumed in modern environment but are basic setting characteristics nonetheless. Economic constraints such as cost and time are situational and influence whether and how tasks are initiated, executed, and terminated. The proximity of sources is a well-documented factor in information seeking, with personal collections and proximate coworkers the most commonly used information ... The physical setting also includes the type of access and procedures for obtaining access. Whether the information is accessed in a personal or shared work area and in paper form or electronic form affects overall information seeking. What forms must be completed, permissions secured, or identification cards shown also influence overall willingness to seek information and its costliness (1995, p. 47).

In addition to the situation which arises from the setting, Marchionini considers the information system to be a part of the setting and that the setting influences the system's performance (1995, p. 49). The setting is also pointed out to be one of the factors that influences users' acceptance or suppression of their information needs (Marchionini, 1995, p. 51).

The physical setting is also one of the major sources of the non-content needs. The non-content needs partly arise from the state of capabilities of the carriers in relation to accessing and using content of desire in each setting. The capabilities of the carriers determine the nature of the content that can be accessed and used in each setting. Content



that can be accessed and used using only the existing carriers in each setting can be perceived to resolve felt gaps in knowledge. The capabilities of the carriers beyond one's setting is not of immediate value and use to users when it comes to resolving one's gap in knowledge. As shown in the discussion of the physical form of information, a number of authors indicate that the carrier-related needs of users arise partly from the computational capabilities provided by each individual setting. The computational capabilities provided by each physical setting for information access and use of information content in electronic form, therefore, influence the nature of carrier-related needs that the user experiences uniquely in each setting. In other words, the setting is involved in giving rise to both the content and non-content needs of users by providing the situations that lead to both aspects of information needs of users.

Therefore, in this research setting is understood to mean specific physical setting where users live or work and in which they seek and meet their information needs. It is also argued that information needs of users vary from one physical setting to another.

### **3.7 Definition of "Use" of information and related assumptions**

Another assumption considered in this research is concerned with the "use" of information. Discussion of use of information is relevant here because users' needs for information are ultimately to resolve felt gaps in knowledge. As argued earlier in this chapter, resolving users' gap in knowledge involves identification and using relevant content. If use of identified relevant content is hampered, resolving felt gap in knowledge also fails. In this way "use" of information is directly related to understanding and meeting the information needs of users. Therefore, it is essential to discuss how use of information is understood or assumed in this research.

As many writers in the field have shown, use of information is one of the diversely treated concepts. Taylor describes the differing treatments of the concept of use of information as follows:

The concept of "use" of information is quite ambiguous. Depending on the context, it may mean the act of choosing a reference to a document

from an abstracting and indexing services. In another case, it may mean receiving an answer to a question or clarifying a problem situation. "Use" can mean the actual insertion of a chunk of information into a report or the direct input to a decision. In a more general sense, we can mean the messages that are part of the educating process, where new information and knowledge form part of the base affecting future decisions and actions (Taylor, 1986, pp. 10-11).

Similarly Abbott acknowledges the existence of misunderstandings in the way the term "use" has been employed in the literature of LIS: "At the very simplest level one could consider the undefined term "use" to relate solely to the physical process of visually scanning the written words. Or, one could consider the undefined term "use" to extend beyond this physical act into the intellectual realm of comprehension of facts into own knowledge and even through the adoption phase to the application of that knowledge"(1989, p. 5).

Accordingly, one finds a wide range of conceptualizations of "use" of information which can be grouped, for convenience of discussion, as physical-use oriented, intellectual-use oriented, application-use oriented, and incremental-use oriented. A physical-use oriented conceptualization can be found in Ford's (1977, p. 7) comment that says the common definition of "use" of information is users' encounter with information packages in libraries in the course of their efforts to resolve their information problems. Ford also recognizes another definition of "use" which is "when part or all of the contents of the package are ingested by the problem solver", which is an example of intellectual-use oriented conceptualization. The act of reading, considering, evaluating and accepting information irrespective of the application of the ideas in the content is another example of intellectual-use oriented conceptualization discussed by Abbott (1989, p. 47). Abbott also disassociates intellectual-oriented "use" from application-oriented acts when she says that "It would seem that the moment of use as opposed to the moment of application, is positioned on this continuum, between awareness and acceptance" (1989, p.59). Garvey (1975, pp. 484-485) is cited in Abbott (1989, p. 39) as supporting the meaning of "use" as being an application of the intellectual content in real life situation. Abbott also cites other writers that support the application-related view of the conceptualization of "use" of information. The idea of incremental-use treatment is found



in those writings that consider “use” of information to go beyond its application for practical problem solving and decision making. For Pessemier (1979, pp. 82-83, cited in Abbott, 1989, p. 46) “use” of literature goes beyond the application limit: “At the most trivial level, the mere fact of publication or exposure, alone, may be seen to constitute a form of use; a deeper level, information is used when it is put to a constructive purpose; at ultimate level, existing information is used when it is processed to generate new information”. Similarly for Kuhlthau (1998, p. 363) “using information involves interpreting and creating, what both Dewey and Burner referred to as “going beyond the information given”.

Thus it can be argued that the confusion and misunderstandings surrounding the concept of “use” of information generally arise because the different conceptualizations focus on one dimension of “use”. On top of that, according to this research, the ambiguity with the concept of “use” of information can be traced back to a poor conceptualization of information. For instance, for writers whose view of information is of content only, “use” of information would relate to *intellectual use* such as understanding, assimilating as well as *application* of the content of information contained in information sources and channels. The same can be said of those whose view of information as physical entity alone who tend to associate “use” of information to the physical aspect of use, such as physically removing of information sources. However, understanding information as a bidimensional entity composed of content and non-content aspects can accommodate and explain the confusion experienced with the concept of “use” of information.

Accordingly, because information exists as composed of content and non-content, at least two types of “use” associated with the two basic dimensions of information have to take place for total use to occur. In other words two types of use associated with the two basic attributes of information can be distinguished as occurring whenever “use” of information takes place. Specifically, content and non-content related use has to take place for effective use of information to occur. Thus, the bidimensionality of information leads to the bidimensional “use” of information, and hence leads to the existence of an acceptable bidimensional conceptualization of “use” of information. Support for this view can be found in SPIN Reflection Group (cited in Abbott, 1989, p.57) who had

observed and identified three levels or stages in the “use” of information which goes along with the view that different types of “use” exist arising from different attributes of information. The three levels or stages that “use” of information involves according to the Group are the medium (an exterior signal which has a physical form), the signification (the signal, which has an intended message or meaning and establishes a moment of relationship), and the effect (the message impacts on the person receiving it. This impact may or may not be what was intended). Multiple conceptualizations of the term “use” of information arising from its multiple dimensions has also been implied by Zaltman (1980, cited in Abbott, 1989, p. 40).

Based on the above premises, the term “use” of information in this research is understood to be composed of uses of the content and the non-content aspects of information, particularly the carrier in which the content is embodied. The nature of use of the content aspect and the non-content aspect of information differs and the concept of “use” of information in this research consists of those diverse features of “use” arising from the use of these two aspects of information. In other words, a combination of features of “use” associated with the different aspects of information are needed for the proper “use” of information to take place. Definitions of the term “use” of information that agree with this view have been put forward by scholars in the field as presented below.

Starting with the fact that the book has physical and intellectual attributes, Abbott identifies two major types of “use” in the “use of literature”, arising from the physical and intellectual aspects of the book:

Once these differences between the physical and the intellectual aspects of literature itself have been clearly defined, then it is relatively easy to distinguish between the physical and intellectual aspects of use of literature. The physical aspects of use of literature include all those involving bodily energy (taking down a book, paging through it, scanning the pages, returning it if unsatisfactory, or when the intellectual use has been completed) and the responses of the senses (sight - seeing the print; smell - whether the paper and ink smell excitingly new or whether the book smells musty; hearing - the crisp crackle of India paper as opposed to the dull flip of heavy, recycled paper; touch - the richness of calf binding as opposed to the matt porous surface of plain board covers). The intellectual aspects of use, on the other hand, include all those involving



the mind and the complex mental processes of reading, comprehension, acceptance (or rejection), recollection, synthesis and retention (1989, p. 43).

Abbott (1989, p. 43) further adds that "It goes without saying that the physical aspects of use are associated with the physical attributes of the book, while the intellectual aspects of use are associated with the intellectual attributes of the book".

Similarly, Wilson defines information use behavior as: "Information use behavior consists of the physical and mental acts involved in incorporating the information found into the person's existing knowledge base. It may involve, therefore, physical acts such as marking sections in a text to note their importance or significance, as well as mental acts that involve, for example, comparison of new information with existing knowledge" (Wilson, 2000, p. 50).

However, as the mental process of understanding, evaluating, digesting, comparing, and accepting, which are all aspects of intellectual use, are unobservable, no one can tell whether or how far intellectual use has taken place except the user himself. Such processes that normally result in change in the knowledge structure of the user are beyond the reach of observers in any concrete way. The same is true of the view of "use" of information as a simple change in the knowledge structure of the user, either through conscious effort of the user or as occurring through unintentional observation of events and objects around oneself. Even when it comes to the application oriented view of use, it is difficult to attribute a given act of application of some knowledge to a given act of use of an intellectual content from a given source. The situation that leads to the application of a given knowledge is usually a result of accumulated knowledge in one form or another. It is also difficult to tell which intellectual content has led to a given act of application since it is difficult to isolate the contribution of an intellectual content use from a given source in a given application act of knowledge in addressing a given problem. It is difficult to always associate every application to a given intellectual content consumed by the user. A given intellectual content might trigger accumulated and unconnected knowledge in the person to make him/her perform a highly sophisticated problem solving act, which involves knowledge beyond the triggering

intellectual content just consumed. At the same time an application resulting from a given intellectual content may take place long after it has been consumed, making it difficult to trace its source. All in all it is difficult to talk in terms of the share of knowledge contributed by the intellectual content of each source.

From the above discussion, the inability to observe use at a mental level clearly applies to the incremental view of “use” of information as such contributions to consumed intellectual content can be a result of earlier unconsciously accumulated knowledge. The increment and the incremental use can also take place years after a given intellectual content has been consumed which will make relating the contribution to any one act of use of the intellectual content of an information source impossible. Furthermore, some of the intellectual uses may not be obvious and easily recognizable even by the user himself. Consequently this research adopts the observable aspect of use in monitoring and measuring use of information for the time being. This logically leaves the physical use to stand for the total use. However, although the term “use” is operationalized here as physical “use”, it is the view of this research that the term “use” should include the intellectual “use” aspect as well. Abbott (1989) recognizes the difficulty of observing the intellectual use which normally occurs in the minds of users and suggests that the physical use tends to be used as indication of total “use”. Taylor (1986, p.16) also seems to agree with the difficulty of determining the intellectual use of information and employs instead the physical use to stand for total “use” when he says that “In speaking of information, Machlup advised, quite correctly we feel, that ‘it seems more reasonable to keep use and effect of use separate’ (Machlup, 1979, p.64). We must separate the fact that something is chosen from the store, from how it is used. We are not yet able to deal very well with the effect of information on performance and with the evaluating that performance... For document-based systems, however, we define “use” as the process of making choices”. Earlier in the book, in fact, Taylor defines “use” of information as “a formal process, the result of either a search for and/or a conscious reception of information” (1986, pp. 10-11).



Furthermore, the physical use can be considered as a prerequisite for the intellectual use, making it an acceptable indicator of possible intellectual use as well. For example, employing the physical use as a valid form of use in the sense that the physical use is a prerequisite to the intellectual use makes sense to Abbott who comments: "If, in considering use of an item of literature, one sees physical use, first, as a valid form of use, then perhaps one could argue that within that period of physical use (between first taking it up and finally putting it down) there is time and opportunity for consideration of the message it conveys and either its acceptance (intellectual use) or its rejection (non-use)" (1989, p.50). Buckland (1991, p. 93) shares this view when he says that "The receiving of information, the sensing of some information-as-thing, is a necessary condition for becoming informed", and adds that "The receiving of information is necessarily the receiving of some information-as-thing". In general, many agree that what is going on at the mental level of users is unobservable by others and requires indirect ways of determining its nature.

Therefore, the assumption regarding the use of information adopted in this research is that of physical use of information composed of the acts of physically interacting with information sources such as books and electronic databases; going through the sources such as browsing, scanning, reading; and consulting the intellectual content such as taking notes or making marks aimed at receiving information content for filling felt gaps in knowledge. The physical use is assumed to stand for unobservable intellectual use as physical use is a prerequisite for intellectual use.

Following the discussion of use of information, discussing the concept of users will be appropriate, although in brief. Regarding users, the following view expressed by Taylor on users is adopted in this research: "The terms "user," "client," "customer," "consumer," though there are some slight differences in meaning, are assumed to have the same general sense as an active agent who seeks or receives information from an information system...The important point is that it is this agent and the situation surrounding him or her which establish the criteria by which the value of information is judged" (Taylor, 1986, p. 11). Thus, individuals who seek, acquire, and judge the

relevance and value of information content from information sources and services available to them in a given setting in their effort to resolve their felt gaps in knowledge constitute users in this research. In other words, this research agrees with the view that the user is unique, active, and central in the development and meeting of information needs as described in the user-oriented conceptualization. The user constructs needs and the information he needs from situations he finds himself in. Each individual is unique in what he needs, and how he meets his needs. Furthermore, as discussed earlier in this chapter, users belonging to a given setting share basically similar information needs as they are exposed to similar factors determining both their content and the content needs. For example, Taylor (1986, p. 15) comments that "Clients or sets of clients live and work in particular environments. It is from this environment that tasks and problems are generated". It is also widely agreed that libraries and information systems have always been providing the tools and the facilities for users to access and use information contents, allowing them to play a role of a major determinant of non-content needs of their constituent users.

### **3.8 Summary of assumptions and premises of information needs and related concepts**

This chapter has presented key assumptions that the current research emphasizes regarding information needs and related concepts. Information is assumed to exist as content and non-content in inseparable ways. Consequently, information needs also are assumed to consist of content and carrier-related aspects in inseparable ways. Information needs are further viewed as dynamic, subjective, situational, and non-specifiable by users. The physical forms in which information content is made available for users' access and use are assumed to be some of the factors influencing the nature of information needs. The discussion on these core assumptions has been to establish that the LIS literature recognizes in one form or another that information and information needs exist as content and non-content in inseparable ways and that the physical form in which information content is made available influences users' needs. The chapter has also presented another set of assumptions of key issues considered in the model



developed by the current research. The issues are the nature of electronic information environment, use of information and physical settings. The electronic information environment is discussed as being where users seek and acquire information content of desire from electronic carriers. Information needs of users in electronic information are also argued to be different from those in print information environment. The physical setting in which users live and work is viewed as the basic source of information needs of users. It is further shown that each setting is unique, leading to uniqueness of information needs arising in each setting. The use of information is viewed as being the physical act of interaction with carriers for the purpose of receiving the contents residing in the carriers.

## CHAPTER FOUR

### IDENTIFICATION OF ELEMENTS AND RELATIONSHIPS OF THE MODEL OF THE INFORMATION NEEDS OF USERS IN THE ELECTRONIC INFORMATION ENVIRONMENT

#### 4.1 Introduction

Models are representations of phenomena and are developed for the purpose of gaining insight into or a better understanding of the phenomena. In representing phenomena under study, models use selected elements and relationships between the elements seen from a certain perspective as appropriate to the specific purpose for which the models are being developed.

This chapter discusses the identification of elements and their relationships in the context of a model of information needs of users in the electronic information environment as proposed in Chapter one of this thesis. The chapter is organized into two sections. The first section discusses the identification of elements of the model in detail. A detailed and step-by-step presentation is followed as this provides adequate information needed to understand the nature of the model and how it is developed. Such detailed presentation also allows for the assessment of the soundness of the model as pointed out by many writers. According to Meadows and Robinson (1985, p. 97) "The choice of boundary - what aspects of the real world to include in and exclude from the model - may be the decision that most influences the outcome of the modeling process. To understand a model or compare several models, one must have a clear picture of how that choice has been made". Britt also states that one of the ways of providing evidence to support the credibility of a model is through a detailed presentation of the process of developing the model (1997, p. 136). Particularly in relation to descriptive uses of models, Britt states that "making descriptive sense of concepts entails being as explicit as possible about procedures used to gather and organize the data" (1997, p.



29). This section also includes a discussion on the procedure adopted to fine tune the selection and organization of the elements of the model. The second section lists the relationships that the elements form in shaping information needs of users in the electronic information environment.

As will be shown later in the chapter, the elements chosen to represent the essence of information needs of users are factors determining the nature of information needs of users in electronic information environment. Understanding the information needs of users from the perspective of factors affecting them has been one of the approaches used in studies of information needs of users in LIS.

The sources of the information used to identify the elements of the model are research findings reported in the literature of LIS. As one of the valid sources of information for model building, extensive and careful review of the relevant literature has been done. Research findings are also the basis of the major assumptions regarding the nature and relationships among the elements which is one of the difficult aspects in model building (Doran and Gilbert, 1994, p. 3; Meadows and Robinson, 1985, p. 5). The approach followed in constructing the model is a 'top-down' approach where the process starts with broad general concepts and then gets down to the specific concepts that make up the model (Benyon, 1997, p. 51).

#### **4.2 Identification of the elements of the model of the information needs of users in the electronic information environment**

This section discusses how and from what sources the elements of the model and their relationships developed in this research. As pointed out in Chapter three of the thesis, information needs of users are composed of content and non-content aspects. While content

needs refer to facts, figures, ideas that users require to resolve gaps in knowledge, the non-content or carrier related needs refer to how users need information content to be made available for their access and use. These two broad components of the information needs of users are considered in this research as the initial or starting elements for building the model of information needs of users in the electronic information environment (figure 1). Figure one shows that the information needs of users are embodiments of content and non-content related needs. These two components represent the information needs of users at a broad level.

However, representing information needs as content and non-content alone is too general to be much use. This is because content and non-content aspects of information needs can be further deconstructed into elements that directly contribute to the understanding of the nature of information needs of users. It is the nature of these elements that constitute the nature of the broad components and hence the nature of information. Thus, it is necessary to separate these two broad components into their constituent elements so that one can get a meaningful level of representation of the information needs of users. Different ways could exist for one to decompose these two broad components of information needs of users into their constituent elements, depending on the perspective adopted and level of detail chosen.

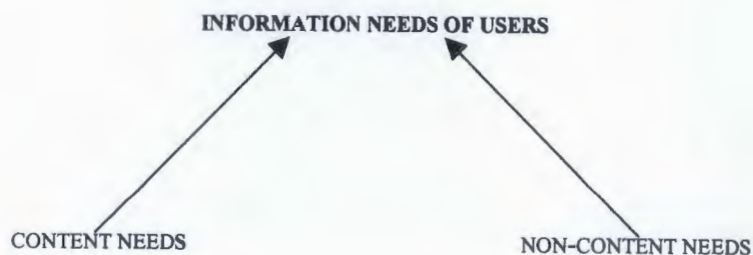


Figure 1. Component elements of the information needs of users



In this research the approach adopted to get to the constituent parts of these two broad components is to identify the factors that give rise to these two aspects of information needs of users. This research adopts the premise that the factors that give rise to these two aspects of information needs provide an adequate opportunity to understand their essence and represent them in a usable form and level. Support for the validity of approaching the task of getting to the constituent elements and essence of information needs of users from the perspective of factors giving rise to them can be discerned from the following paragraphs.

Understanding the information needs of users through the factors affecting information needs has been one of the approaches employed in LIS research. Paisley (1968) reflects that the information needs of users are influenced by their everyday or work environments. Understanding these environments is the key to understanding the information needs. Bouazza (1989, p. 155) points out the validity of the approach as follows: "psychologists try to predict (or at least explain) human behavior by identifying some determinant factors. This appears to hold for any user study. Since information use is a behavior, it seems essential to understand the factors that influence it". Rohde (1986, p. 53) notes that "Another way of handling this difficult concept [information needs] has been to identify the factors which affect information needs". Other writers also make comments and suggestions of a similar nature. Furthermore insights as to the nature of factors affecting information needs that need to be studied are also suggested. Mick, Lindsey and Callahan (1980, p.354) state that factors that could affect user behaviour in each specific setting are those that need to be studied. Durrance implies that the factors could be psychological, technological, and social: "promising investigations into psychology and social factors that influence information needs should be continued" [and] "there must be further examination of the effects of societal trends and technological changes on future information needs"(1989, p.129). Rohde (1986, p. 53) summarizes the different factors identified by different writers in LIS literature as follows:

Lin and Garvey (1972) identified the type of work ([for example], researcher or teacher) as the most important factor influencing need. Whether the work is basic or applied and the discipline in which the person is working also are

important factors (Lin and Garvey, 1972). Information needs may be influenced by the systems available to satisfy them (Hanson, 1964; Lin and Garvey, 1972). Other environmental factors such as social, political, economic, and legal systems within which a person operates and interpersonal relationships can be important as well (Crawford, 1978; Krikelas, 1983; Paisley, 1968). Needs also may grow out of previous needs in the course of solving a problem, making a decision, or completing a work related task, for example (Krikelas, 1983).

Allen (1996) also states that the factors could be individual, group, organizational and social in origin. The author argues that "In any concrete situation, these different factors will combine to provide information needs that are unique to that situation or to that user group"(1996, p. 87).

Taking cognizance of this, determining factors affecting information needs of users for the purpose of better understanding and predicting information needs has been in use in library and information science (LIS) research for quite some time now (Rohde, 1986). All these point out that for understanding of the information needs of users, one approach could be of understanding the various factors that would be responsible for the nature of information needed. In other words, unravelling the information needs can effectively be done by first focusing on the factors that shape and influence such needs of users.

With the above understanding, the representation of the information needs of users with its two broad components (figure 1) can and will be substituted by factors affecting content needs and factors affecting non-content needs of users in representing information needs of users (figure 2). Figure two shows that the essence of the two broad components of information needs of users considered here are the factors that cause them. This will be the second level of identification of elements of the model of information needs of users in the electronic information environment for the purposes set in Chapter one of the thesis.





Figure 2. Factors affecting content and non-content needs as components of the information needs of users

The factors affecting content and non-content needs of users, and which are going to be the component elements of the model of information needs of users in this research, are discussed below. Since the model of information needs of users to be developed in this research is specifically for the electronic information environment, the factors affecting the information needs of users that are relevant only in the electronic information environment will be considered here.

#### **4.2.1 Factors affecting the information needs of users in the electronic information environment**

To identify the factors affecting the information needs of users (both content and non-content) this research uses factors that have been identified and widely discussed in the literature of LIS.

As discussed in Chapter three of the thesis, the concept of information needs is used in varied ways, namely, as related to content only or non-content emphasized, but mostly

without specifying which of the two aspects are being considered. These varied, and some times confusing uses of the concept of “information needs” are also reflected in the literature on factors affecting the information needs of users. This means that at times it is not clear which aspect of information needs is affected by which factors. Therefore, in this research care has been taken to consider the literature that clearly points out which aspect is being referred to or where the aspect being referred to is clear from the context of the discussion. In addition, the research also identifies and organizes factors using its own approach and assumptions in cases where the literature has no direct discussions on some of the factors relevant for this research.

#### **4.2.1.1 Factors affecting information content needs of users in the electronic information environment**

As discussed in Chapter three, content needs of users generally arise from the setting in which users live and work. Specifically content needs arise from problem situations that individuals face in performing their everyday tasks, including work-related tasks. Belkin and Vickery (1985, p. 18) conclude that “the results of research in information behaviour since the mid 1960s have consistently argued (in some cases demonstrated) that information behaviour is related to some problem situation in the relationship between the user and the user’s world or model of the world”. Wilson also notes that the cause of uncertainty or information gap is generally ‘a problem’ and “the problem may be more or less recognisable as a problem in the normally understood sense of the word, but something in the individual’s life-world, which may be the world of everyday life of the citizen, or the world of work of the scientist, professional worker...” (Wilson, 1999, p.265).

Users experience problem situations when they realize that their current state of knowledge is insufficient to perform a task or to manage a situation in life. This understanding points out that tasks that individuals perform and the state of knowledge of users performing the tasks are the causes of problem situations. Tasks or activities that individuals engage in on



an everyday basis, including work tasks, are one of the sources of problem situations widely discussed (Allen, 1996; Bystrom and Jarvelin, 1995; Ingwersen, 1995; Ingwersen, 1996). Tasks or activities refer here to mental and/or physical activities that individuals perform or pursue in their day-to-day life, including work related activities. More often, individuals encounter tasks for which their current state of knowledge or knowledge structures are not sufficient to understand and execute. The realizations of the inadequacies of one's state of knowledge lead to problem situations where the individual may decide to look for information from potential sources in order to understand the nature of the problem situations and their solutions and hence be able to execute the tasks. As implied above a number of writers point out that work tasks are one of the causes leading to the need for information content directly or indirectly. Although the majority of these writers use the term *information* only in their discussions, it is considered here as referring to information content, as can be seen from the context of their use of the term. One of the writers who argues that needs for information content arise from the task in which users are involved is Ingwersen, who states that

... the emphasis on knowledge for action by actor implies that an important reason for a desire for information is to obtain knowledge in order to perform some kind of mental actions or task activity in organizational and other social environments. Such reasons do not have to be confined to problem solving issues, but may in addition involve cultural and emotional goals and interests (Ingwersen, 1992, p. 115).

Ingwersen (1995, p.168) also states that "the uncertainty is caused by a problematic situation in the recipient's problem space, which again is dependent on his or her underlying goals, worktasks, interests, and emotions". Ingwersen and Willett further indicate that work tasks or interests in life lead to problematic situations which in turn lead to information needs: "In recent years, research both inside and outside IR, [for example] in cognitive engineering, has suggested that the *actual work task* related to a domain, or the fulfilment of socio-cultural/emotional goals related to an interest, may be the principal causes for the user to be in a problematic situation and to need information" (1995, p. 170). Durrance (1989, p.127) points out that "Information needs vary according to the nature of the activity in which the

end user is engaged, the environment in which the activities take place, and the personal characteristics of the user". Similarly Taylor stresses that work tasks and responsibilities generate problem situations that lead to information needs (1986, p. 35). The work task is the most discussed factor leading to problem situations (Bystrom and Jarvelin, 1995; Ingwersen, 1992; Ingwersen and Willett, 1995; Leckie, Pettigrew and Sylvain, 1996; Taylor, 1986). Taylor, for example, maintains that "In our information culture today, it is for the most part the organization that provides the context and establishes the tasks and responsibilities from which problems, and hence information needs are generated" (Taylor, 1986, p. 35).

The current state of knowledge or the knowledge structures of users are the second factors leading to the occurrence of problem situations, and hence information needs (Allen, 1996; Belkin, Oddy and Brooks, 1982; Ingwersen 1996; Vickery, 1997; Wilson, 1994). Existing knowledge structures of each individual are the basis for each user to understand and execute or pursue tasks and activities. Every time individuals encounter tasks or interests, they consult their knowledge structures. When existing knowledge structures lack the knowledge required to understand and execute a given task, problem situations occur which lead to information content needs. More specifically, problem situations are created when the facts, figures, and ideas that the user possess are less than what is required to perform the tasks at hand. According to Allen "Information need occurs when the knowledge structures of the user do not provide an unambiguous interpretation of the situation or do not provide a highly authorized course of action" (1996, p. 65).

In related discussion on the nature of problem situations that lead to information content needs, many writers stress that each setting is unique in terms of the concerns, problems, activities, and tasks which lead to unique problem situations. According to Krikelas "Studies of general publics, as well as those focusing on special audience ([for example], blue collar workers, scientists, academic librarians, engineers, historians, and others) have demonstrated that the setting in which a person works (or lives) has a great influence on defining



needs”(1983, p. 10). Taylor (1986, p. 15) states that “the structure of the environment, in many complex ways, determines what information is acceptable (i.e., has value) for clarification, solution, or alteration of a problem, or for the accomplishment of a task. A message then is given value by a “user” who sees its potential “usefulness” because he or she is in a particular environment and can relate the message to the problems and tasks of that environment”, and hence the corresponding information needs. Finally, Nicholas (1996, p. 3) simply states that “It is in the office and home that information needs are hatched”.

In LIS literature, information content needs are also said to be affected by the persons’ role, discipline, phase of work, age and other factors in addition to the task (Devadason and Lingam, 1997, p. 42; Leckie, Pettigrew and Sylvain, 1996, p. 182; Rohde, 1986, p. 53; Wilson, 1994, p. 24). However, it is the view of this research that the task factor is adequate to serve the purposes for which it is being considered here. This is because in whatever role, discipline, or phase of work, the task that the individual has to perform as appropriate in each is which determines the information content needs. In other words, it is a given task that leads to problem situations that we are concerned with as leading to content needs, whether it is for a role-related task or discipline-related tasks. It should further be noted that unless users realize that there is a gap between what they know and what is required to execute a task at hand, they will not experience problem situations. This, however, does not mean that they do not have information needs. As discussed in Chapter three of this thesis, users normally do not clearly understand their problem situation and hence their information needs. As research by Faire-Wessels (1990) and others have shown users may not realize their day to day problems as problems as well. That is why identifying potential problems that users may encounter in a given setting and provide information that could be used to address the problems is one useful approach to meeting users’ needs.

The specific information content needs that each individual user experiences as a result of the problem situations arising from tasks are unique to each individual. This is so because the facts, figures, and ideas that each user needs in order to perform tasks at hand are what

he/she lacks in his/her knowledge structure at the time of confronting the tasks. Problem situations are created when the facts, figures, and ideas that the user possesses are less than what is required to perform the tasks at hand. This creates gaps in knowledge which is simply information content needs. When two users face problem situations in executing a similar task, the facts, figures, and ideas that each needs to resolve his/her problem situations and execute the task, vary depending on how much knowledge each already possesses regarding the task in his knowledge structure. Therefore, the knowledge level of the user in relation to performing the tasks at hand also determines the nature of content that he/she needs to resolve the problem situations arising from tasks.

Therefore, factors affecting information content needs of users according to this research are tasks that individuals have to perform in their everyday life which lead to problem situations when the current state of knowledge of the individuals regarding the tasks to be performed is less than what is required. It is also important to stress that the factors giving rise to information content in the electronic information environment also hold true in the print information environment. This is because gaps in knowledge that users face when they encounter tasks that they do not understand occur irrespective of the information environment where the needs is to be met. What users know regarding the tasks they encounter is independent of the information environment where they would search for facts, figures, and advice to meet their information needs. In other words, tasks and current state of knowledge of users are factors influencing problem situations, hence information content needs. This holds true irrespective of the type of information environment in which users find themselves, i.e., be it print or electronic information environment.

#### **4.2.1.2 Factors affecting the non-content needs of users in the electronic information environment**

Although it has been recognized that many writers emphasize the non-content aspects of users' needs particularly related to physical carrier aspect of information, the literature of



LIS does not provide direct discussion on factors specifically associated with the non-content needs of users in the sense used in this research. One possible explanation for the absence of direct discussion of factors affecting non-content needs in the sense used in this research is probably because earlier related researches have not approached the non-content needs of users in the way as has been done so in this research. Therefore, this research identifies factors affecting the non-content needs of users adopting a conceptual framework which takes into account the basic assumptions of the research and which is based on sound reasoning. The identified factors on the basis of this conceptual framework, thus, are selected as appropriate factors affecting the non-content aspects of the information needs of users as part of the elements of the model developed in this research.

The conceptual framework or perspective used to identify and select factors affecting the non-content needs of users is as follows. Once the content needs are realized and the decision to fulfil the needs is made by a user, what follows is the engaging in an information activity to ensure that the potentially relevant information content is acquired so that the gap in knowledge is filled. The information activity that takes place between the decision to pursue and the acquisition of potentially relevant information content for mental processing is *access to information*. Once the decision to fulfil the gap in knowledge is made, the different thoughts related to how to go about fulfilling it and the activities ensuing to put the thoughts into practice essentially revolve around the act of accessing potentially relevant information. Accessing information is a necessary activity or process between deciding to pursue and actually receiving potentially relevant information content, irrespective of the form in which information content exists. In accordance with the assumptions of this research, access to information involves access to the carriers that contain the potentially relevant content as well as to the actual content. It also involves the thoughts and plans in relation to how to go about getting or receiving information content, identification of what exists and where it exists, and interaction with the potentially relevant carrier and content therein. Each specific sub-activity or sub-process under thoughts, identification, browsing, interacting and evaluating are what seem to be emphasized in the description of the activity

of accessing by different writers. Many also represent this phase with a generic process of “information seeking process” and many of the models of information seeking behavior can be seen to be composed of essentially of the acts of accessing (examples, that of Kuhlthau, 1991 and Ellis, 1989). In simple terms then accessing information (both content and non-content) is what is done or needs to be done for the purpose of acquiring relevant information content to fulfil the felt gap in knowledge by users. Without accessing information appropriately, the potentially relevant information content cannot reach the cognitive sphere of the user where mental acts of understanding, assimilation or rejection, and resolving the gap in knowledge take place.

However, each user setting allows the activity of accessing the potentially relevant information content only in a particular way depending on its capabilities to provide what it takes to access information content in a given form. More specifically, the possibilities of accessing information content in each setting are limited by the capabilities of the available carriers in which the content resides as well as the abilities of the users in manipulating the carriers for the purpose of accessing and using the content in the carriers. In other words, the process of accessing can take place in each setting if the relevant content is accessible and usable within the capabilities of the carriers and users’ abilities to interact with the carriers. Therefore, depending on the capabilities of their carriers and personal abilities, users in each setting experience specific preferences and needs with regard to how the relevant information content has to be made available for their access and use. Relevant content has to be made available for users’ access and use within the constraints of the prevailing capabilities of the carriers in order to resolve users’ gap in knowledge. Unless the content is accessible and usable within the limits of the existing carriers in each setting, access and use of content that could resolve the gaps in knowledge cannot take place. These user preferences and specific options as a result of existing possibilities of access to electronic information content in each setting constitute the carrier-related or non-content needs of users in this research. These preferences are part of users’ needs for information because what happens during this stage practically affects whether the users’ gaps in knowledge are



resolved or not. Unless their particular preferences arising from their capabilities in carrying out this activity are met, the process of acquiring potentially relevant information content for fulfilling the gap in knowledge is disrupted, making this part a critical component of meeting the information needs of users. As this stage determines whether the potentially useful information content is acquired by the user or not, the process of resolving the gap in knowledge depends on it as well. Therefore, the need for information to fulfill the felt gap in knowledge in users also includes specific needs related to accessing the relevant content because there are always only given possible and appropriate ways of accessing information content depending on the capabilities of the carrier containing information content in each setting. These needs are carrier related or non-content needs because they arise from the state of access to the carrier in each setting.

Based on the premises of this framework that the state of users' capabilities for accessing information in each setting is responsible for specific carrier-related preferences and needs, this research is of the view that factors affecting access to information in a given setting also give rise to the carrier-related needs of users. In other words, factors determining access to information shape the non-content needs of users since the non-content needs of users arise in relation to accessing information in a given form in each individual setting. Specifically in the context of this research for example, factors influencing access to information in electronic form in any particular way in a given setting will give rise to specific non-content needs of users of that setting in electronic information environment. Thus, in this research factors affecting access are also the factors that give rise to the particular non-content needs of users in each setting.

As pointed out earlier, the non-content needs referred to here are carrier-related ones. These carrier-related needs vary from one form in which the information content to be accessed exists to another as users' capabilities for accessing the different carrier of the different forms differ in each setting. The factors that determine accessing information content in electronic form can and will then be considered representing the non-content needs as

elements of the model being developed. The section below identifies the factors of access in electronic information for use as factors determining the non-content needs of users.

#### **4.2.1.2.1 Factors affecting access to the electronic information environment**

Before embarking on the discussion of factors affecting access to electronic information, the following observations about the literature of factors affecting access to information must be made.

- a) The bulk of the discussion on factors affecting access to information in LIS literature commonly appears in terms of dimensions or attributes of *accessibility*, namely, physical availability, proximity, ease of use, and prior experience. These are discussed in detail later in this chapter.
- b) The discussions on factors affecting access to information largely occur in the context of factors affecting *use* of information or selection of information sources and/or channels, where accessibility is identified and discussed as the principal factor (Bouazza, 1989; Gerstberger and Allen, 1968; Klobas, 1995; Leckie, Pettigrew and Sylvain, 1996). In other words *use* is primarily affected by *accessibility*. It is only if the dimensions affect *access* that *use* will be affected. So the discussion where *use* and only the dimensions of *access* are mentioned, *access* is understood to be the link between the dimensions of *access* and *use*. As a result, most of the supporting citations on factors of accessibility have *use* context to the extent of not mentioning accessibility directly. For example, Abels, Liebscher and Denman (1996, p. 154) have demonstrated that use is affected by the dimensions of access where they noted that two dimensions of accessibility, namely, availability of workstation and proximity to be primary factors for use and non-use of network resources while the other two dimensions of accessibility, namely, prior experience and ease of use are responsible for the intensity of use and the number of services used.
- c) Overlap in scope among dimensions of accessibility is common in the literature of LIS. Some writers use just one of the dimensions while others use more than one of



the dimensions to refer to the same issue. An example can be where users' prior experience is used to represent or refer to both experience and ease of use. As ease of use is affected by the person's experience and familiarity with a particular system, such reference to both could be logical under specific situations. Therefore, in many instances readers may have to distinguish the context of use of each dimension and if necessary to understand it in the sense that it is being used, i.e., it might be necessary to understand prior experience as including ease of use as well at times.

- d) Furthermore, allusions or indirect references to some important supporting data which have come from research in the non-electronic information environment might be made every now and then in this section of the thesis because of their applicability to the electronic information environment as well. In line with this view, Abels, Liebscher and Denman (1996, p.148), in winding up their discussion of earlier works, note that "there is a reason to believe that factors influencing the adoption and use of traditional sources and channels will also influence the use of electronic networks". Klobas (1995, p. 97) also notes that "As electronic information resources have characteristics of both information sources and information technology, it seems reasonable to expect that use of electronic information sources can be explained by a combination of the factors included in information use studies and technology use studies" from library and technology related fields.

With these points in mind, the following paragraphs discuss factors affecting access to electronic information for the purpose of identifying a further level of detailed representation of non-content needs of users in the electronic information environment in the model.

Abels, Liebscher and Denman (1996, p. 147), based on the reviews of findings prior to the emergence of the electronic information environment, as well as from research related to the electronic information environment, identify proximity, prior experience, ease of use and workstation availability as dimensions or factors affecting the accessibility of electronic information. Besides finding supporting research results from the pre-electronic information

environment, Abels, Liebscher and Denman (1996, p. 147) have also established the following to be the case in electronic information environment

- *workstation availability* affects perceived accessibility in the electronic information environment which influences usage
- *user prior experience* with a particular system, or a similar system, contributes to perceived accessibility of that system, [and hence its usage] including that in electronic information environment
- *ease of use* has been found to be an important factor of use in studies of electronic information environment

Abels, Liebscher and Denman (1996, p. 155) further observe specific instances where these dimensions affect accessibility or perceived accessibility which in turn affects use in the context of electronic network use:

- For non-users, the major deterrent to using the network appears to be lack of access to workstations
- Proximity of the primary workstation appears to be the most dominant of the individual attributes of perceived accessibility
- The number of people sharing the workstation is another important attribute influencing adoption of the network
- Prior experience and ease of use do relate significantly to the number of services used and intensity of use
- The correlations for perceived expertise are somewhat stronger than those for length of time using the network. This indicates that length of time using a system is an incomplete measure of experience.
- Perceived ease of use does correlate significantly with network use and number of services used
- It seems plausible that ease of use is a perception that increases with increased experience with the system and its services.



Culnan (1985, p.302) defines access in terms of its dimensions as “physical access to the source, the interface to the source, and ability to physically retrieve potentially relevant information”. This essentially covers the areas under Abels, Liebscher and Denman’s view above, that is, physical availability of the electronic information sources, as physical access to the sources and interface requires the physical availability of the electronic information sources; prior experience and ease of use as the ability to retrieve information content from the sources depends on skills and familiarity with interface and the sources. Specifically in relation to computer- based sources, Culnan (1985, p. 303) states that accessibility encompasses physical access to a terminal and the system, the ability to formulate a query using the system’s command language (interface dimension), and the ability to physically retrieve potentially relevant information. Culnan further comments that firstly physical availability of computer facilities, equipment, and software (terminals) to gain initial access to electronic information systems, then skills and exposure to achieve experience and ease of use, and lastly physical access to actual information systems or databases and the content therein on a continuous basis which improves perceptions of accessibility are necessary for use to happen (1985, p.307) .

The dimensions or attributes of accessibility discussed by Klobas (1995, p. 96) consist of ease of use; physical access to information resources, which could include the information sources and the delivery systems involved; and intellectual access (understanding). In this definition as well much of the attributes of access as put forward by Abels, Liebscher and Denman is shown. The attribute of intellectual access or understanding is the unique attribute here, which in fact is a controversial issue of access to information for some (Buckland, 1991).

Similarly, McCreadie and Rice ( 1999, p. 63) point out that information access involves physical proximity, ease of use, and prior experience: “... However, it cannot be assumed that physical proximity and information access necessarily follow one another... Other factors may come in to play such as timing, ease of use, experience, etc.”.

Experience of Texas A&M University indicates that lack of the necessary equipment is a major factor for non-use; physical distance from the electronic systems and services is also found to affect the convenience level which in turn affects use (Clark and Gomez, 1990, p. 242). The authors further indicate that convenience and ease of use to be essential factors affecting use of databases. The issue of awareness about what is available is an additional factor pointed out by the authors as being important in affecting the use of the electronic resources (1990, p. 247). From these findings, the availability and proximity of a system, ease of use and an aspect of prior experience ( namely, awareness), which are all attributes of accessibility, are affecting the use of information.

Palmquist and Kim (1998, p. 5) observe that “Selecting an information system is influenced by many factors including psychological, social, economic, and cultural factors. Individuals’ perceptions of, experiences with, and expectations of a system, the availability and characteristics of a system are some examples of such factors. The use made of an information is also affected by these factors”. It can be seen that the factors identified by Palmquist and Kim are similar with the attributes of accessibility in Abels, Liebscher and Denman (1996).

Research results and observations in Least Developed Countries (LDCs) also show that generally constraints with physical availability of computing facilities and network infrastructure, constraining policies of access and use of the resources, and low users’ skills are the fundamental factors affecting deploying ICTs as tools for provision of development information in these countries. Inadequate computing facilities; poor network infrastructure; lack of skills in interacting and maintaining these; restricting policies of access and use to computing facilities and networks; and absence of relevant content, both in terms of focus and presentation, have been identified by Cheneau- Loquay (2000) as common obstacles affecting access and use of networked information content, including the Internet. Aguolu (1997) points to lack of users’ skills and awareness and infrastructural facilities to be typical factors affecting the flow of the world’s wealth of development information to LDCs.



Factors affecting digital LIS development, hence access and use of electronic information content by the constituent users, in Southern Africa are shown to basically relate to inadequacy of computing facilities and network infrastructure, users' low experience in accessing and using electronic information resources, and low physical accessibility of content because of language barrier mainly (Muswazi, 2000, p. 81). The case study at the University of Dar es Salaam shows that a combination of lack of equipment and skills are the dominant factors affecting the promotion of computer-aided library and information services (Wema and Nawe, 2000, p. 158), and hence user access and use of electronic information content. CD-ROM services in Ethiopia are also shown to be affected by similar factors such as:

- Lack of sufficient workstations, printing facilities and funds for database subscription.
- Difficulties in finding original documents identified through CD-ROM database searches.
- Difficulties experienced by end-users, due to the inconvenient location of workstations.
- Shortage of qualified manpower, particularly technical, for system maintenance and troubleshooting .
- Inadequate coverage of databases of locally generated information.
- Lack of funds for a sustainable CD-ROM database subscription (Teklemichael, Wood and Ford, 1999, p. 331).

Kanamugire singles out costs of CD-ROM, that is, initial and recurrent costs for hardware and software systems; network resources and databases; human resources; information sources in different format; information services such as interlibrary loan and document delivery; online searching; user training; staff training; supplies, and maintenance as fundamental factors affecting the provision of CD-ROMs for users' access and use (1997, pp. 134-135) These factors lead to physical unavailability and inaccessibility of the computing and network facilities and electronic information sources and absence of user

skills. Kanamugire (1997) further discusses inconvenient policies and procedures as additional challenges to CD-ROM based services for users' access and use of content in LDCs. According to him "Such policies include: use control measures by user type; charges for period of use or number of pages printed; limit by time of service available or period of search; mediated searching by librarians rather than end-user searching; and filling out search forms. Most users find these inconvenient and unnecessary: indeed they are barriers to information access" (Kanamugire, 1997, p. 139). Similarly, Stueart (2000) maintains that users' skills, both end-users and information professionals, and poor technological infrastructure are contributing factors affecting access to scientific and technical information in Asia region.

Lishan (1999) organizes barriers to Internet and content development to Africa under economic, technical, infrastructural, and political and regulatory factors which essentially cover the same aspects relating to the factors identified by the writers above. According to Lishan, these barriers include non-availability of local information content and tools for communities, non-availability of interfaces to diverse local languages, non-availability of tools that can be used as low cost off-line solutions, limited network supportive infrastructure development in sub-urban and rural areas, limited technical assistance in improving bandwidth, and lack of an enabling regulatory environment (1999, p. 130).

Based on the above observations, in this research factors affecting access or accessibility of electronic information are, thus, composed of physical availability of workstation, proximity, ease of use of information systems and users' prior experience with information systems.

Although each of the writers in the earlier paragraphs indicate all these factors to affect access to electronic information, the literature of LIS further shows that many more writers discuss one or two of these factors of access to electronic information. Some of these authors will be discussed below to stress that these factors enjoy a wide acceptance.



#### **4.2.1.2.1.1 Physical availability of workstations**

In LIS literature, the physical availability of computer facilities and electronic information sources has been one of the factors receiving emphasis as a factor determining access to electronic information (Adams and Bonk, 1995; Culnan, 1985; Lancaster and Sandore, 1997; Lehmann and Renfro, 1991; Lishan and Wood, 1999; McCreadie and Rice, 1999; Moahi, 1999; Molholt, 1989; Starkweather and Wallin, 1999; Stueart, 2000). Of those who focus more on physical availability, Starkweather and Wallin (1999, pp. 653-654) identify, among others, printing problems and problems with network connections, which lead to physical unavailability of computing facilities, and lack of access to some of the CD-ROMs and lack of online citation indexes, which means physical unavailability of the electronic information sources, as factors affecting the use of computer-based information resources by users. Adams and Bonk (1995) discuss cost of connection to networks, equipment, database subscription, among others, which are needed to ensure the physical availability of electronic information as factors affecting access to electronic information. The authors also stress the primacy of connection to networks and availability of equipment (1995, p. 126). Stueart emphasizes that in Asia the major factors affecting access to scientific and technical information are costs and regulations that lead to physical unavailability and inaccessibility of computing facilities and network infrastructure and electronic information sources (2000, p. 110). Lehmann and Renfro (1991) reveal that connectivity and cost, among others such as content and user friendliness, which primarily affect the physical availability of information facilities and sources to be determinant factors of use of electronic information services among humanists. Particularly, the connectivity issue in their research covers not only "the installation of network connection and provision of the necessary hardware and software" but covers also the idea of connecting people to resources, that is "getting the scholars to the resources with a minimum effort on his or her part" (Lehmann and Renfro, 1991, p. 411). Connectivity to content through gateway and connectivity to physical system such as equipment, including support for installation and set up, are aspects associated with

connectivity according to these authors (Lehmann and Renfro, 1991, p. 411). Lishan (1999, p. 313) also indicates that particularly in Sub-Saharan Africa, the high cost of ICTs, both initial and operational costs because of mounting taxes, running and reskilling costs; poor network infrastructure, such as unreliable telecommunications and energy supplies; mismatch between imported systems and the local environment; and low quality of training, leading to low level of user skills are among the major constraints of deployment of ICTs for users' access and use. In connection with the physical availability of Internet resources, Nahl (1998) mentions the possible disk space on a web server as an important factor of access to information content on the Internet. Nahl states that "The space issue becomes potentially prohibitive even with academic and professional users who receive Internet services as part of their job setting. As more people begin to own virtual real estate in cyberland, space and traffic becomes forces that threaten users' ability to explore and build the virtual information world" (1998, p. 365). Moahi points out that the physical unavailability of computing facilities and network infrastructure and skilled manpower to operate such resources are at the root of difficulties in establishing a health information network for telehealth in Africa: "Electronic networking has many prerequisites: good telecommunications, availability of the equipment (computers, modems, etc.), and manpower to utilize the technology. It is the lack of these that is at the root of the problem besetting Africa in implementing electronic networks. All the above are not found as abundantly as they are in the West" (1999, p. 46).

In relation to the physical availability of the software as factor influencing access, Hunt and Joselyn (1995, pp. 258-259) note that "... the lack of intelligent retrieval software allowing users to specify areas of interest may limit their accessibility and utility". They also say that "... the software brings functionality to a dataset and determines whether it resides in a simple plug 'n' play, transfer or analytic GIS environment" (Hunt and Joselyn, 1995, p. 259). Both of these statements indicate the role of interface in access to electronic information with which ease of use is associated.



From the above and similar other discussions, the physical availability related issues can be generalized to include the physical availability of computer hardware and software, network connections and electronic information sources and the content therein.

#### **4.2.1.2.1.2 Proximity of workstations**

In the literature of LIS, the proximity or physical accessibility of available computing facilities and electronic information sources and the content therein has also received emphasis as being a factor of access. This has been expressed by McCreadie and Rice (1999, p. 61) as follows: "most studies interested in access to information systems have focused primarily on physical access or access to other individuals ... That is, they emphasize how physical access influences or constrains both use and evaluation of information". McCreadie and Rice (1999, p. 61) further observe that "In general, that which is closer in space, especially if it is visible, is more likely to be accessible ... and, in particular, proximity to a system tends to increase likelihood of its use...". The authors add inconvenience and annoyance experienced while attempting to gain access to information which affects the physical access to available electronic resources as factors negatively affecting access to electronic information. Lancaster and Sandore (1997) comment that use of information sources can be increased greatly by making them more widely accessible such as by moving them from limited-access CD-ROM network to a campus-wide computer network which is organized so as to improve physical accessibility of information sources. Culnan (1985, p. 307) states that "online catalogues can improve access to library collections as long as the user is able to master the system's command language and gain physical access to a terminal". Starkweather and Wallin (1999) identify limited library hours and lack of use space among factors of access, which basically affect access to electronic information by affecting physical access to available electronic resources.

In relation to the physical access to information content, McCreadie and Rice (1999) and Molholt (1989) state that the way in which information content is organized and what is

included in the electronic information sources are factors influencing access to information content, respectively. Molholt (1989, p. 132) comments that "what is included in a database limits access. If certain aspects of a journal, such as letters or brief communication, are not picked up in the indexing of that journal, our access to and awareness of them is censored ...". Continuing, the author adds that "In addition to choice about the number of subject areas to be indexed, other choices - such as the terms to be assigned, the depth of indexing ([for example], the general term 'furniture' versus the more specific term 'chairs'), and its consistency both over time and among indexers - are also involved" (1989, p. 132).

Meadows (1999, p. 11) brings to light that physically accessing information content also depends on the availability of appropriate computing facilities and software when he says "new forms of handling information may not be available to users whose equipment is not state of the art... Similarly even if the information can be captured, the actual on-screen image will depend on the software employed. So the appearance of an electronic publication can vary with the system used to retrieve it". Kanamugire (1997) highlights document non-availability containing full length content of citations from bibliographic CD-ROM databases as a critical challenge to the provision of CD-ROM based services for users' access and use in LDCs. Kanamugire (1997) notes that because of existing poor collections; delay in receiving requested interlibrary document, resulting from high cost and poor communication infrastructure; and exorbitant costs of full-text image databases, users' access and use of content in LDCs are affected. Stueart (2000) also indicates particularly a lack of physical accessibility of full-texts cited in bibliographic databases to be common factors affecting access to scientific and technical information in Asia.

From the above and similar other discussions the proximity or physical access related issues can be generalized to include physical access to available computer hardware and software, networks, and electronic information sources and the content therein.



#### 4.2.1.2.1.3 Users' prior experience

Wider reference in LIS literature is being given to users' prior experience with electronic information facilities and information sources as being the other factor affecting access to electronic information (Adams and Bonk, 1995; Culnan, 1985; McCreadie and Rice, 1999; Palmquist and Kim, 1998; Starkweather and Wallin, 1999). The role of experience as a dimension of accessibility broadly can be noted from the following observation: "One who has learned to cope with new situations or problems is more likely to have developed the skills necessary to do so again" (McCreadie and Rice, 1999, pp. 69-70). The authors add that

One's level of experience and expertise will be situation- and domain-specific. Any one individual is likely to be expert on some situations and a novice in others. Repeated use, especially successful use, is likely to increase one's level of expertise with any given system, as well as with system use in general... Familiarity and successful past use of an information system are likely to increase the potential for a user's having developed appropriate techniques to gain access to information... (1999, p. 70).

They further note that "Learning and skill level are both cumulative, particularly with regard to access to information ... competence compounds [particularly referring to communication competence and technological competence] overtime and use" (McCreadie and Rice, 1999, p. 70).

Similarly, Marchionini states that "Experience with a variety of information problems and systems leads us to develop both a general knowledge of how information is organized and the skills needed for facilitating access to it" (1995, p. 13). The author further comments that "Experience with particular settings, domains, and systems generally allow more comprehensive and accurate mental models and thus more facility with these models. The information seeker's personal information infrastructure affects overall performance while solving information problems and executing tasks and continues to develop as information seekers accrue experience and knowledge" (Marchionini, 1995, p. 33). He also points out that users' acceptance of the gap in their knowledge (i.e. information content needs) is

somehow influenced, among others, by their experience: "Acceptance [of one's gap in knowledge] is influenced by knowledge about the task domain, by the setting, by knowledge of search systems, and by the information seekers confidence in his or her personal information infrastructure" (Marchionini, 1995, p. 51).

User experience is further shown as a critical concern in the electronic information environment as the majority of users are in a continuous state of acquiring and updating skills and knowledge with the electronic information resources. The primary reason for this is because the information world has the inherent character of changing at a rate faster than users can assimilate (Nahl, 1998, p. 360). Nahl maintains that "The information age has created a new status for users that may be referred to as a 'lifelong novicehood', an expression that represents the reality for most people who are intermittent yet steady users of the information highway" (1998, p. 359). Nahl adds that novicehood in the information world never ceases and even information professionals will always be novices who will have to learn, keep up with, and operate the latest versions of multiple systems (1998, p.359). Nahl concludes that "Lifelong novicehood creates new kinds of challenges for information professionals because nothing can be taken for granted about what particular users may already know", making the issue of skill acquisition a continuous aspect of users. These make acquisition of skills and familiarity a critical and continuous process in the users' life. Mansell and Wehn stress that "opportunities for using ICTs creatively require technical and human capabilities that are built up through experience with the technologies and services" (1998, p. 10).

In a broader sense, Hertzum and Pejtersen (2000, p. 764) maintain that users' perception of accessibility seem to be influenced by their prior experience in that "the more experience an engineer had with an information source, the more accessible it was perceived to be". Culnan (1985, p. 306) reflects similar view by confirming that experience with a source improves perception of source accessibility. These views establish the direct influence of prior experience on the perception of physical accessibility.



Although it is generally discussed broadly as relating to the computing facilities and electronic information sources and the content therein, users' prior experience here should be primarily limited to users' experience with the interfaces of the electronic information system because basically it is the interfaces that mediate between end-users and the electronic information systems, i.e., the workstation, the electronic information sources and the content residing in there. Since the interfaces in a given electronic information system are considered here from the point of view of users seeking information to resolve felt gaps in knowledge, users' prior experience specifically refers here to their prior experience in using the interfaces for seeking information in the electronic information environment. The activities of seeking information in the electronic information environment include definition of the problem, selection of sources, articulation of the problem, examination of results, and extraction of information content from the results (Marchionini, 1995; Large, Tedd and Hartley, 1999).

Skills in the use of computer-based information systems and electronic information sources tend to attract more attention in LIS literature as a factor affecting users' experience and hence access to electronic information. McCreadie and Rice (1999, p. 64) maintain that "Given the diffusion rate of technology mediation as the primary means of access to information, technological competence becomes a major influence or constraint on access". The authors further point out the skill levels of users to be factors of access particularly in the electronic information environment as follows:

The facility or skill level with information systems is likely to influence the information seeker's ability to access information. It is also likely that both past experience and the design of the system will influence that level. Included are skill levels in navigating an interface or interface protocol ... and with the command language of a system ... Some systems require a higher skill level than others and therefore, their level of complexity influences the skill level necessary to gain access (1999, p. 65).

Based on earlier studies, Culnan (1985, p. 306-307) suggests that "when a system is first introduced, users will initially require a large amount of training and support in order to

become comfortable with the system's command language" which highlights the priority of skill for the successful adoption and use of electronic information resources.

Palmquist and Kim (1998, p. 5 ) stress skills as important factors of use in electronic information environment:

Users must not only figure out what they really want to know but also understand how the system should be used. As information systems are developed based on different technologies and for different purposes, their ways of functioning vary from one to another. This implies that each system might require the user to be equipped with different psychological and/or physical skills in order to get the best result from the system.

In Bishop's (1994, p. 714) survey, although there are other factors identified, lack of skill from absence of training appears to have wider impact across the surveyed population of the study where lack of network training and awareness were noted by both network users and non-users as factors affecting use. Lack of skills and awareness of what is available have also been identified as negatively affecting use by Starkweather and Wallin (1999).

Besides skills and familiarity with the interfaces, information literacy skills are also considered important component of the user experience in this research. Mansell and Wehn (1998) maintain that "There is little to be gained from access to global, or even local, digital information resources if the skills to select, interpret, and apply the information are absent or very poorly developed throughout the population" (1998, p. 100). Information literacy skills, as separate from interface-use related skills, have been described in various ways. However, as Webber and Johnston (2000, p. 382) point out the core components reflected in the different definitions consist of information needs recognition, search formulation, source selection and interrogation, information evaluation and information synthesis and use. Information literacy is identified in many researches as a factor affecting access to electronic information. Information seeking activities in the electronic information environment as discussed by Marchionini (1995) and Large, Tedd and Hartley (1999) reveal that not only interface-use related skills but also information literacy skills are required in order for users



to acquire information content to resolve their gaps in knowledge. Furthermore, the strategies users employ for searching and using information in the electronic information environment include browsing, formatting, grouping, highlighting, indexing, citing, digesting, abstracting, formulating, transmitting, interpreting, connecting, and skimming (Nahl, 1998, p. 332). Use of these strategies requires users to have information literacy skills in addition to their skills related to the use of the interfaces. It is also indicated that users in the electronic information environment are also involved in choosing databases, choosing search terms, conducting the search, reviewing results (feedback review), making new decisions in response to evaluation results, and terminating the search and getting a printout (Nahl, 1998, p. 336). These information activities also require users to develop information literacy skills in addition to interface skills. Nahl also stresses that "Information literacy skills provide users with the prerequisites of how to read instructions, evolve mental maps of systems, keep notes that are needed later, check one's typing, retrieve, filter, and evaluate information and retrace one's electronic steps. Lacking these skills, information-illiterate users may be overcome by technophobia, discouragement, and avoidance"(1998, p. 364). Nahl also highlights a range of information literacy skills required in an interactive electronic information environment: figuring out screen instructions and command option lines; understanding the notion of canceling a command; constructing a viable cognitive map of the system; maintaining routinized checking procedures for typing accuracy; paying close attention to command structure, spacing, and shortcuts; keeping notes that are retrievable when needed; retrying operations with slight modification and refinements until they succeed (1998, p. 360).

Different aspects of information literacy skills have also been emphasized by different writers as factors affecting access. McCreddie and Rice (1999, p. 63) argue that one's understanding of one's information need is a potential access factor: "One's understanding that a need for information exists and the level of understanding of that gap, problematic situation or anomalous state of knowledge most certainly influence the likelihood of gaining access to information to address it...". In the electronic information environment, Cosijn and

Ingwersen (2000, p. 539) maintain that users' ability to formulate a request depends on their information retrieval and conceptual knowledge background and their understanding of their information need.

As a part of information literacy skills, McCreadie and Rice (1999) also discuss users' attitudes about their competence and experience and attitudes toward information seeking, toward computing, about an information system's convenience, and about information system's dependability or availability as affecting users' attempts to gain access. Continuing in the same line, the authors also identify confidence and fear as related to the degree to which an information seeker perceives him- or herself to be in control of the situation as factor influencing access. The authors point out that such users' attitudes are related to the relative status, experience and supply of resources. They also maintain that helping users to develop confidence in gaining access is a role for information workers which is one of the aims of information literacy programs in LIS.

In a relatively better setting with regard to physical access to computer facilities and connectivity, knowledge or awareness of what is available and skill in using the information systems are also found to be important factors affecting the use of electronic information resources (Adams and Bonk, 1995). In the same way, Starkweather and Wallin (1999, pp. 653-654) point out that "One other frequently mentioned library-generated obstacle experienced by many participants [in their research] was a lack of information about the libraries' electronic resources". McCreadie and Rice (1999, p. 64) elaborate that awareness "includes awareness of sources, channels and means of addressing the situation, awareness of one's right and entitlements with regard to access to that information and awareness of how to proceed in the information seeking process".

The influence of familiarity with similar computer-based information systems on current capability of users in accessing electronic information is raised by Palmquist and Kim (1998, p. 10):



... Campagnoni and Ehrlich also found that the degree of experience with computers affected the ways users had of information-seeking. Users with prior computer knowledge and experience searched information more analytically, exploiting various system features, whereas those with no prior computer experience or knowledge searched in a less systematic manner, essentially “browsing” large displays rather than using system features to minimize retrieved sets.

In connection with familiarity in particular, McCreddie and Rice (1999) generalize that when one becomes familiar with information tools and the information seeking process, the skill level increases and access becomes easier.

From these and similar observations, users’ prior experience basically covers users’ skills with the interfaces in accessing electronic information contents. It also covers related information skills, including users’ awareness and attitude, and familiarity with the information systems in general.

#### **4.2.1.2.1.4 Ease of use**

The last factor discussed in LIS literature as affecting access to electronic information, although not as widely as the other two and usually indirectly, is ease of use of the electronic information systems. Although in its broader sense, ease of use covers how easy or difficult a system/source of information is to learn and use, it is used here primarily as associated with the interface as it is commonly used. For example, in the study of accessibility and ease of use in the electronic information environment, it has been found out that “ the majority of responses for “accessibility” concerned the informational and physical dimension of accessibility, while the majority of responses for “ease of use” concerned with the interface dimension of the system, or the command language” (Culnan, 1985, p. 306). This shows that ease of use primarily relates to interface. Furthermore, it is the interfaces of electronic information systems that users come in contact with when they seek information content to fulfil their gap in knowledge. From the users’ point of view, the electronic information system essentially means the interfaces (Marchionini, 1995) as it is with the interfaces that

they deal when interacting with such information systems. Poor capability or difficult-to-use interfaces could mean non-availability of the system for users in resolving their gap in knowledge. In the literature, the issues of ease of use are also discussed under the concept of user friendliness of a system (Lehmann and Renfro, 1991; Nahl, 1998; Nicholas, 1996). For example, Nahl's discussion of features of user friendliness of a system mainly revolve around how easy the system is to use and to learn to use.

The interfaces here cover aspects of the electronic information system that intermediate between the end-users and the electronic information system. Thus, those parts of electronic information systems that facilitate interaction between end-users and systems are part of the interface: keyboard and other input devices such as the mouse and touch panels, printers and other output devices such as the visual display unit, and the interface program or software. The interface program in the context of the interest of this research is required to support the information seeking process of users in the electronic information environment. As pointed out earlier, these activities of information seeking in the electronic information environment consist of defining problem, selecting source, articulating the problem, examining results, and extracting information content (Marchionini, 1995; Large, Tedd and Hartley, 1999). Ideally, then, an interface program is meant to provide support to these functions of information seeking in electronic information environment. However, the different existing interfaces provide support to these functions at different degrees of success. For example, the same software interface with different versions provides the support with different degrees of success, the latest version usually providing the better degree of support. In this connection, Marchionini states that "Just as information sources vary in validity and reliability, so do interfaces, and users must establish evaluation and selection standards for interfaces just as they have for information sources" (1995, p. 21). In this research then, the ease of use of the interface is whether users find it easy or not to learn and use the interfaces, mainly the software program, in the process of their seeking information in the electronic environment. How the interfaces are easy or difficult for users to learn and operate, and hence enable the users to perform the functions of information seeking in electronic



information environment is the focus of this factor. Ease of use and capabilities of interfaces also include their abilities to accommodate individual differences, cultural diversity of individuals, and users' affective and cognitive characteristics (Marchionini, 1992, p. 162) and hence to allow users of all levels and intentions to carry out information seeking. Therefore, the state of ease of use of the currently available interfaces determines how far information seeking to resolve felt gap takes place in the electronic information environment.

In connection with ease of use as a factor of access in the electronic information environment Fiscella and Proctor (1995) note that the ease of use of end-user systems, among other factors, contributes to faculty use (or non-use of) electronic resources. Lehmann and Renfro (1991) also stress user friendliness of the interface, among others, to have been identified as determinants of use. A simpler interface to encourage usage has been argued as being desirable by other writers as well (Abels, Liebscher and Denman, 1996; Marchionini, 1995; Harris, 1989, cited in Abels, Liebscher and Denman, 1996). The issue of difficulty in using interfaces in general is widely recognized and is receiving due attention as one of the key areas of concern to ensure effective information seeking in the electronic information environment (Marchionini, 1995; Nahl, 1998). Nicholas acknowledges that users experience problems even with the so-called user friendly interfaces (1996, p 36).

Furthermore, the effect of ease of use as a factor of access to electronic information could be indirectly reflected by the other dimensions of accessibility (i.e., physical availability, proximity and users' prior experience) because ease of use that users feel is dependent on user experience and some features of the physical availability and accessibility attributes. For example, Abels, Liebscher and Denman (1996, p. 152, 155) show that ease of use is not only affected by how difficult a system/interface of the system is, but also by the experience of the user.

In conclusion of the discussion of factors affecting access to electronic information, we can say that in LIS literature these four factors of accessibility, namely physical availability of workstation, physical accessibility or proximity of workstation, ease of use of systems, and users' prior experience with systems, have been widely established as affecting access to electronic information. As indicated earlier, the attentions these factors are receiving individually or as a group indicate that these factors are widely recognized factors of affecting access to electronic information. The above discussion has also shown that in summary these factors have the following attributes:

*Physical availability:* Physical availability of computing facilities (computer hardware and software and other electronic information related facilities and equipment as well as space needed to carry out the accessing of electronic information sources and content); physical availability of electronic information sources (CD-ROM, local and remote-located electronic databases, the Internet and other networked information sources) and the content therein.

*Physical accessibility (proximity):* Physical accessibility of the computing facilities (proximity, policy, and other issues that affect the physical accessibility of the existing computing facilities and space); physical accessibility of the electronic information sources (such as the proximity of information sources, and the convenience of access of facilities where the electronic information sources are housed); and physical accessibility of information content (such as whether users ultimately receive contents of desire from the electronic information sources) residing in the information sources.

*Users' prior experience:* Skills and familiarity of end-users in using the existing interfaces of the computing facilities; skills and familiarity of end-users in using interfaces of computing facilities in general; skills and familiarity of end-users in using the interfaces of existing electronic information sources and networks such as CD-ROM, online databases, and the Internet accessible for use; and information literacy levels of end-users.



*Ease of use*: How difficult or easy the existing different interfaces used for interacting with the computing facilities in general and for accessing information contents of desire from the electronic information sources in particular are to learn and operate by users.

On the basis of the argument that factors affecting access to information affect the carrier-related or the non-content needs of users, the physical availability and accessibility (proximity) of the carrier and the content therein, users' prior experience in interacting with the carrier and the content therein, and the ease of use that users feel of the carrier and the content therein will be used as factors giving rise to the non-content needs of users in building the model of the information needs of users in an electronic information environment. This completes the third level of identification of elements of the model. Thus, we have now a full set of elements for building the model, namely, users' tasks, physical availability of carriers, physical accessibility of carriers, ease of use of carriers, and users' prior experience with carriers representing the content and non-content needs of users and hence the information needs of users (figure 3). Figure three shows that the factors that give rise to the two broad components of information needs are users' tasks, physical availability of workstation, physical accessibility of workstation, ease of use of information systems, and users' prior experience with information systems.

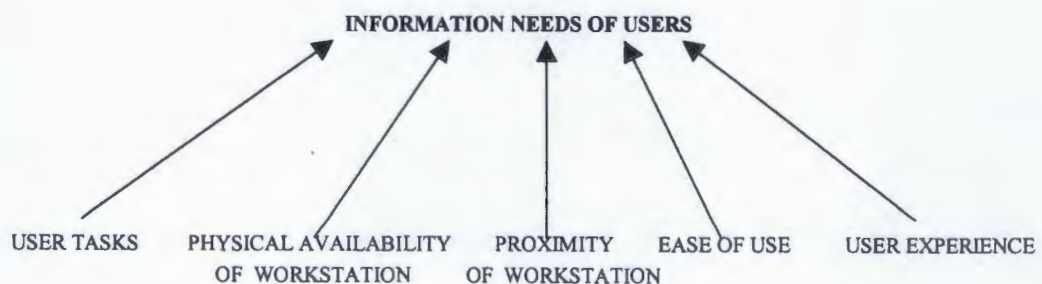


Figure 3. Factors affecting the information needs of users in the electronic information environment as components of information needs of users

As shown above, the state of each of the factors of access in each setting influences the nature of access to computing facilities, electronic information sources and the content therein in a unique way. The states of computing facilities and electronic information sources and the content therein in turn determine the presentation of the relevant content appropriate for resolving the gap in knowledge by users since the content has to be accessed in order for the content to reach users' knowledge structures. In other words, users' needs in the electronic information environment also involve needs that arise from the state of computing facilities and the electronic information sources and content therein in each setting. More specifically, resolving users' gaps in knowledge requires not only relevant facts, figures and ideas, but also accessible and usable facts, figures and ideas, within the constraints of existing computing facilities and electronic information sources in each user setting. If the relevant content has to resolve gaps in knowledge it has to be accessible, and what is accessible is determined by the state of access to relevant content in each setting. Consequently, users' needs to resolve their gaps in knowledge require accessible and usable relevant information content; the accessibility and usability being within the capabilities of the existing computing facilities and the electronic information sources that users can employ in each setting. In this way, the state of access in each setting is involved directly in determining the nature of the carrier- related needs of users in electronic environment as users' needs are ultimately to resolve gaps in knowledge. As the state of access to carrier and the content therein vary from setting to setting, the information needs of users are distinct in each setting. Therefore, the states of access to carrier and the content therein give rise to non-content related needs, which together with the content-related needs determine the nature of the information needs of users in the electronic information environment.

#### **4.2.1.2.2 Nature of the non-content related information needs of users in the electronic information environment**

The states of the availability and accessibility of the electronic carrier and the content therein, its ease of use and user experience determine the nature of access. In turn the nature



of access determines the nature of content appropriate for resolving knowledge gap. This is because in order to resolve users' knowledge gap the content has to be accessible within the state of access prevailing in each setting. From this one can see that the basic nature of carrier-related needs which users' experience are that the information content be made accessible and usable within the constraints of their state of access to the carrier in their settings. Each of the factors giving rise to carrier-related needs influences in its own way what the nature of the content has to be so that it is accessible and usable by users within the constraints of their settings. Despite the state of access and use of their carrier, users still need to resolve their gaps in knowledge which makes it necessary that the content be accessible and usable with what means they can employ.

Many arguments and observations indicate that users prefer that which is easier and more convenient to access and use. The theory of least effort as discussed by Poole (1985, p. 87) points out that human beings prefer that which involves less effort on their part, which reveals an inherent tendency by users to prefer to have the content made available to them within the capability the carriers currently in use. In his discussion in relation to the of theory of least effort, Poole hypothesizes that users prefer to use accessible channels because the effort required to use them is less (1985, p. 87), which will be no better than what they already have. Poole also hypothesizes that as one gains experience with a channel, it becomes easier for one to manipulate the channel to one's satisfaction (1985, p.87). This again supports the idea that the existing carrier with which users are familiar, are the chosen ones when selecting a carrier to resolve gaps in knowledge. Poole further hypothesizes that "a channel which possess information [content] being sought, and which produces such information [content], lowers the need for further expenditure of effort by the user"(1985, p.88), thereby increasing its preferability. In the same line of thought Nicholas states that "People will usually use what is the easiest and what is closest to hand, and not what is actually best or most appropriate. They will take the path of least resistance, providing they have a choice" (1996, p. 36).

Similarly, Marchionini makes the following two assumptions about users in the electronic information environment: first, "End-users want to solve their information problem; they want to do their work or accomplish their goal. They want answers rather than pointers; they want document delivery rather than information retrieval. End users do not care about the design of the information system, the elegance of the retrieval engine, or the structure of the data unless these severely impede the accomplishment of their goals" (1992, p. 156). The implication of this assumption is that they need to accomplish their goals despite the state of their information capabilities; what is possible to accomplish their goal under their own current circumstances is what they need. Therefore, to accomplish their goals they need the information content made available within the resources they can employ.

The second assumption of Marchionini about the end users is that:

End users want to achieve their goals with a minimum of cognitive load and a maximum of enjoyment. They do not want to be distracted from their real task or divert scarce cognitive resources to the retrieval task. Moreover, humans seek the path of least cognitive resistance and prefer recognition tasks to recall tasks; most people will trade time to minimum complexity. Finally, humans will perform better and continue to use systems that are pleasurable or interesting. Humans prefer heuristic processes to algorithmic processes because they are more interesting and because they reduce complexity to simpler judgmental operations... (1992, pp. 156-157).

This assumption also reveals users' inherent preference for the convenient which in this case is an inclination towards having the information content made available in a way compatible with what they have at their disposal. Marchionini further points out that end users will often use default sources that have proven useful in the past, or that are readily accessible and easy to use (1992, p. 158).

Marchionini (1995, p. 63) also makes a reference to Simon (1979) who discusses "satisficing" which is defined as a psychological form of the law of diminishing returns, i.e., that we do not seek optimal solutions to certain problems because the costs are too high, so we settle for solutions that are satisfactory given the cost. Marchionini agrees to this law by



commenting that "This principle is clearly demonstrated in libraries whose users show high levels of satisfaction because they are able to find at least some relevant items with minimal investments of time and effort. This result is even more common in electronic environments because time and effort can be minimal and the scope of sources can be broader".

Marchionini (1995, p. 52) earlier concludes that "It is well known that information seekers prefer colleagues or human sources to formal sources and proximate sources of information and easy-to-use systems. These preferences are powerful factors in information seeking and reflect natural human efforts to minimize costs, especially to seek the path of least cognitive resistance". Again this reveals the tendency of human beings to go for the convenient and to what is believed to be possible and optimal under the circumstances.

Morris (1994) discusses users as having the characteristics of an unwillingness to spend a lot of time learning systems and a preference for the familiar, which are again similar to the tendencies of human beings observed by Poole and Marchionini above. Finally, Culnan (1985, p. 302) cites Wilson (1977) as arguing that users' "information gathering behaviour is a function of the information [content] discovered to be available and the ability to use information [content] based on effort, and the usefulness of information [content] based on experience", which can be interpreted as what users need are what are acquirable and usable with what they have.

The LIS literature further shows that accessibility of the information carrier and hence the content therein is the overriding factor in selecting and using information carrier.

Convenience and ease of access and use of information channels and sources have been shown to come before quality and amount of information content (Gerstberger and Allen, 1968; Klobas, 1995; Taylor, 1991). Taylor observes that "Accessibility appears in many studies to be the single most important variable governing use of information" (1991, p. 228). Klobas (1995, p. 96) also points out that in the literature of LIS, users have shown that it is convenience and ease of use over quality that determines their preference for information content. These issues of accessibility and ease of use are partly functions of users'

capabilities which will make the existing level of access to resources one of the underlying factors influencing users' preference. In this connection McCreadie and Rice note that "the degree of matching between what the user needs [based on her/his current capabilities] and can make use of most effectively and what and how the system makes available its resources, can strongly influence the degree to which the interaction leads to access" (1999, p. 66). Similarly, Harman and Lunin (1992, p. 153) maintain that "The underlying systems must provide the answers sought by the users in a manner that requires minimal or no training, and in a manner that is totally compatible with the information-seeking environment. A terminal in a shopping mall should be able to answer simple queries on desired merchandise, and then produce a map to those stores..."

The choice of channels and sources on the basis of utility of the information content retrieved has also been shown to be the priority factor (Rosenberg, 1967; Gerstberger and Allen, 1968; Chakrabarti et al., 1983 cited in Hertzum and Pejtersen 2000). It has been shown that "the positive correlations between frequency of use and both utility, availability, and ease of use were statistically significant" (Hertzum and Pejtersen 2000, p. 764).

Users are also rational beings who generally keep in perspective what is realistic under the circumstances. Consequently, users generally set expectations based on their prior experiences of what their setting could provide them with (Faibisoff and Ely, 1978; Greene, 1990; Nicholas, 1996), which makes the desire for information content likely to be made as fitting their existing resources. Culnan (1985) notes that without prior experience with a given information source, users are unable even to form accurate perceptions about the source, leaving those already experienced by the user to remain the probable choices. Marchionini (1995, p. 55) states that "The information problem and the user's personal information infrastructure, [which is defined as an individual person's collection of abilities, experience, and resources to gather, use, and communicate information (1995, p.11)] determine the information seeker's expectations about the number of units required to complete a task, although these expectations often change as information seeking



progresses". Marchionini treats users' expectations as almost synonymous with their needs. He observes that:

To understand and define a problem, it must be limited, labeled, and a form or frame for the answer determined. The problem may be limited by identifying related knowledge or similar problems or by listing what specific knowledge is not related. Concepts, words, phrases, events, or people related to the problem can be listed and grouped into categories that serve as the basis for assigning labels and problem statements...This process represents what Taylor [1968] called the *conscious need*. The information seeker may hypothesize what the answer will be but at least creates an expectation of what the answer will "look like", for example, will be a date, a fact, a route, an idea, an interpretation, or an expression. An expectation of the physical form of the answer ([for example], texts with tables, an image with an annotation, ideas shaped from interaction with various people and documents) may emerge that, in turn, strongly influences the selection of a search system. These expectations about outcomes ultimately guide (and bias) action. The limiting, labeling, and framing of solution properties lead to the articulation of an information seeking task, what Taylor referred to as the *formalized need*. While defining the problem, the information seeker represents the problem internally as a task with properties that allow progress to be judged and then determines a general strategy to use for subsequent steps(1995, p.52).

Marchionini also mentions that users' judgment of immediate physical and mental costs of engaging in information seeking to be one of the factors that leads to the suppression of one's information needs (1995, p. 51).

The relevance of the above discussion of users' inherent preference for the convenient and easy to use carriers and information content therein and its subsequent influences on expectations is that, according to this research, this inherent aspect of human nature and its consequences is reflected in the nature of users' information needs. It is a part of the process that determines the nature of information needs of users.

#### **4.2.2 Conceptual specification and labelling**

Each element of a model should represent distinct aspects of the phenomenon being modelled. Britt (1997, p. 22), for example, stresses that as building blocks of a model, each element has to be discrete so that one can separate one from the other. One of the steps in the model building process is, thus, ensuring that each element represents a distinct aspect of the phenomenon under consideration. The major tool in ensuring this is the process of specification which is “grouping indicators of elements together that have properties in common and separating indicators that have different properties in common” (Britt, 1997, p. 22). Indicators here are the essence of the elements or the meanings of the elements while the labelling or naming of each the element is a summarized representation of all the indicators under each.

Discussing specification of elements, Britt (1997, p. 25) states that the meaning of the concepts or the elements is ultimately embedded in indicators and their relationships to one another. The indicators are what constitute each element and can be seen as variables, that is, those which vary and the effect of which is reflected by the elements. By putting together indicators that hang together into categories, the process of specification minimizes the overlap of indicators of elements. It also enriches and strengthens the clarity and meaningfulness of the elements. The grouping is on the basis of some commonalities that have bearings on the essence of the model. The specification and respecification applicable to elements require examining and re-examining of the indicators until they hang together and make sense in the context of the model.

As indicated above, the specification process also involves labelling each group of similar indicators with a name, thus, name of elements of models. The name of an element stands for a summarized common meaning of similar indicators in a group. Therefore, the process of specification and respecification in model building is iterative and continuous until similar indicators, on the basis of some commonalities, are categorized under an appropriate



category and given a representative name or label. This ensures that each element which will be composed of similar indicators is discrete.

The respective attributes or the various instances of the factors affecting non-content related needs that are summarized in this section indicate the essence of each factor as understood here. The respective attributes constitute what is meant by each factor in the context of factors affecting the non-content needs of users in the electronic information environment. More specifically, the:

- physical availability of hardware, interface, and electronic information sources and the content therein are indicators of the physical availability of a workstation;
- physical accessibility of the hardware, interface, and electronic information sources and their content are indicators of the physical accessibility (proximity);
- ease of use of interfaces to learn and operate are indicators of ease of use; and
- interface use skill, information literacy skills, and familiarity are indicators of users' prior experience.
- nature of tasks and current state of knowledge of users can be considered also as content related needs.

According to concept-indicator model of conceptual specification employed by qualitative researchers in building models, these attributes can serve as indicators of the elements representing the content and non-content needs of users in the model. Concept-indicator models are particular forms of display which explicitly show just what indicators are being used and what are taken to be the underlying commonalities (Britt, 1997, p. 32). Concept-indicator models are used as aids for conceptual specification and respecification as the process is iterative in model building.

Consequently, as a part of the model building process, there is a need to ensure that the attributes of the factors affecting content and non-content needs in this research are grouped together and labelled accordingly. It is also necessary to make use of the identified attributes

in a way that suits one's purpose because the attributes identified here were not originally meant to serve the purposes of model building. This obviously requires some acceptable manipulation of the indicators provided that their meaning and presence are preserved as in the original. According to this research, careful study of the list of attributes of the factors affecting non-content needs has led to conceptual specifications discussed below.

The first focus of specification involves the interface. The issue of interface is covered by two or more of the elements representing the non-content needs of the model, leading to a scattering of indicators with a potential overlap. The physical availability as well as the capabilities of existing interfaces are the concern of the physical availability of software under the element of the physical availability of a workstation. This is because the physical availability of workstation requires the availability of all components of the system: hardware, software, network, and information sources and their data (Rowley, 1998). At the same time, the ease or difficulty of learning and using the existing interfaces is the concern of ease of use. Therefore, there is a need to impose order so that no two elements of the model have overlapping indicators, which in this case is eminent because of the scatter of the attributes of interface. Pulling together all interface-related indicators under ease of use may be possible. However, some of the concerns related to interface from the other elements are not about easiness or difficulty that users feel about the interfaces when learning or using them. Therefore, what is done in this research is to merge ease of use as an element with physical availability. By merging ease of use with physical availability all indicators of interface are put under the physical availability of interface. This makes more sense since difficult to use interfaces are as good as being not physically available. In this case, to keep the original emphasis given to the ease of use of interface as a factor of access, and hence non-content needs, it will be used as one attribute of interface under the physical availability element. The interface will have to accommodate the features of all interfaces that it has inherited from the ease of use element from the specification process and the dimensions of interface will be understood as including ease of use features as well.



Another issue for conceptual specification involves the physical availability and accessibility/proximity of hardware, software, and electronic information sources and the content therein. The concepts of availability and accessibility are so interwoven that it is often difficult to use them as referring to one of the two specifically. For example, the physically available information sources are as good as not physically available if they are not physically accessible. Or what is physically accessible by default is physically available. Therefore, each seems to embody the other which will make it difficult to tell whether both senses are being referred to or not when each is used separately. The difficulties of use of the concept of accessibility by writers in the area of factors affecting information access is recognized by Abels, Liebscher and Denman (1996, p. 146) in their review to identify factors of accessibility in the electronic information environment. This embodiment of the concepts of availability and accessibility is considered in this research to lead to a possible overlap.

Consequently, this research merges the two under one. As a result of their relationship one can serve as an attribute of the other. Although it is possible that either one of the two can include the other, physical availability is selected to represent both because it also includes issues relevant here but not covered by physical accessibility. For example, physical accessibility does not recognize the needs arising from absence of appropriate software. Or physical accessibility takes for granted that the electronic information sources are available, and hence ignoring needs arising from physical unavailability of appropriate information source, for example. Accordingly, proximity as physical accessibility can serve as one instance or attribute of physical availability. We can define physical availability here to mean something actually physically available for users' access and use.

From these specifications it is clear that none of the meanings of the factors identified from the literature have been canceled out or undermined. The change is only organizational. At the end of the day their contributions as well as meanings will still be there whether they are organized under one category or another or whether they make their contributions as an indicator or as an element. Any of the indicators here could be elements and vice versa in

another context, showing that rearranging or reorganizing them is just to suit the specific context in which they are being considered.

According to the conceptual respecifications above, then, from the earlier four elements representing non-content needs, we have now reduced them to two elements representing the same. The remaining two elements after respecification will have more attributes than they had before since they have to reflect the attributes of those that have merged with them. Physical availability of hardware, software, electronic information sources and their content, then, will add physical accessibility of the hardware, interface, electronic information sources and their content as well as the ease of use that users feel of interfaces, which are inherited from the ease of use and physical accessibility elements. These additions are concretely reflected with the dimensions that each indicator will have for its measurement, which is required to determine the state of each element which in turn is the basis that determines the nature of non-content needs that each element of the model is giving rise to.

As indicated above the specification process also involves labelling or naming of the elements to ensure that the names of elements are the summary of meanings of each of the indicators under them. The process of specification in this connection is also required to ensure that the elements “differentiate individuals, groups, classrooms, organizations, communities, and so on in terms of how intensely the qualities associated with the concepts [elements] are manifested”(Britt, 1997, p. 45). This is done by labelling or naming the elements in such a way that they capture dimensionalized information of the aspects of the phenomenon that they stand for. In this connection, Britt (1997, p. 45) argues that with the name of elements “There must be a specific and communicable sense of just what is varying”. Consequently the following two types of modifications in names of the elements are made to meet this requirements in building models.

The first modification concerns the name of the element “physical availability of workstation”. Since the physical availability of workstation has added new indicators, it



obviously needs adjustments to ensure that it also reflects the meanings of its new additions. Specifically the attributes from physical accessibility and ease of use need to be incorporated into the name of the element as well. Taking into account that the name to accommodate all these needs to be broad enough, this research selects the term “electronic information resources” as an element name for all the indicators in there. After all, it is about the state of the electronic information resources that we are talking, namely the combination of computer hardware and software, networks, and electronic information sources and their content. According to the results of the modification and conceptual specifications above, the attributes of the “electronic information resources” will be the physical availability and physical accessibility hardware; the physical availability, physical accessibility, and ease of use of software in use; the physical availability and physical accessibility of electronic information sources; and the physical availability and physical accessibility of electronic information content.

The second modification involves all names of elements. In order to ensure that the elements of the model capture dimensionalized information and permit discrimination, a qualifier that reflects the essence of what varies is needed. For this purpose, this research chooses the terms state of the “electronic information resources”, the level of user experience and nature of “user tasks” as the modified names of the elements of the model. It is the states of each of these elements that distinguish the nature of information content and non-content needs that arise in each setting, and hence the information needs of users in each setting.

With regard to naming of the factors affecting the content needs of users, the following clarification needs to be made. The name of the element representing the attributes of tasks and the current state of knowledge of users should have been one that reflects the meaning of both attributes. It is the interplay of the two attributes that gives rise to problem situations, hence information content needs. However, for lack of a suitable concept or term that reflects the combined meanings of tasks and current state of knowledge of users, the name “user tasks” is used to represent factors of content needs in the model. The choice of “user

tasks” was made simply because the concept of task is widely used as a factor of information content needs in LIS literature. However, in this model “user tasks” represent more than physical/mental activities. They are understood here to reflect the interplay of tasks or activities that individuals have to perform and their current state of knowledge with regard to tasks. It is the interaction of these that lead to problem situations that give rise to information content needs.

Therefore, the elements of the model representing information needs of users in electronic information environment from the point of view of the factors that give rise to information needs are “user tasks”, the state of “electronic information resources” and the level user experience (figure 4).

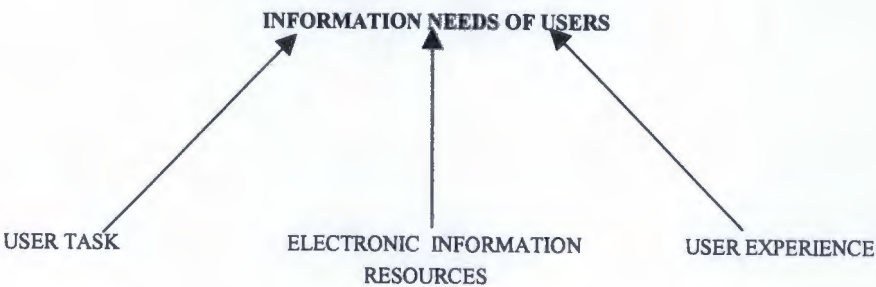


Figure 4. Elements of the model the information needs of users in the electronic information environment



#### **4.3 Identification of relationships of the elements of the model of the information needs of users in the electronic information environment**

The elements enter into distinct relationships in creating information needs of users. The relationships discussed here are the different influences that the elements have on the information needs of users arising out of the interplay of the elements in the electronic information environment as well as the influences that each element may have on each other in the context of generation of information needs of users in the electronic information environment. While all elements contribute to the nature of information needs of users in the electronic environment directly, their influences among each other are both direct and indirect. These relationships are listed below.

- “User tasks” generate information content needs in users if what users know about tasks or activities at hand is short of what the tasks take for their accomplishment.
- “Electronic information resources” influence directly the nature of information content that users need in the electronic information environment depending on the state of the physical availability and accessibility of the computing facilities and electronic information sources and the content therein in each setting.
- User prior experience influences directly the nature of information content in electronic information environment depending on the level of users’ skills and familiarity with the interfaces of the computing facilities and electronic information sources in use in each setting.
- Content needs can be considered as triggering needs around which the non-content needs are revolving to ensure that the desired content reaches the knowledge structure of users to resolve users’ gaps in knowledge. Information content and its carrier are interwoven as content always exists in some carrier.
- “Electronic information resources” influences users’ prior experience (Abels, Liebscher and Denman, 1996, p. 154; Adams and Bonk, 1995; Culnan, 1985, p. 307; McCreadie and Rice, 1999, p. 70) because the physical availability and accessibility of computing facilities and electronic information sources determine the level of

interaction that one may have. The acquisition and development of skills and familiarity largely depends on the level of interaction with “electronic information resources”. Thus, the state of “Electronic information resources” directly influences the level of user experience, which influences the nature of information needs contributed to by the state of users’ prior experience in electronic information environment.

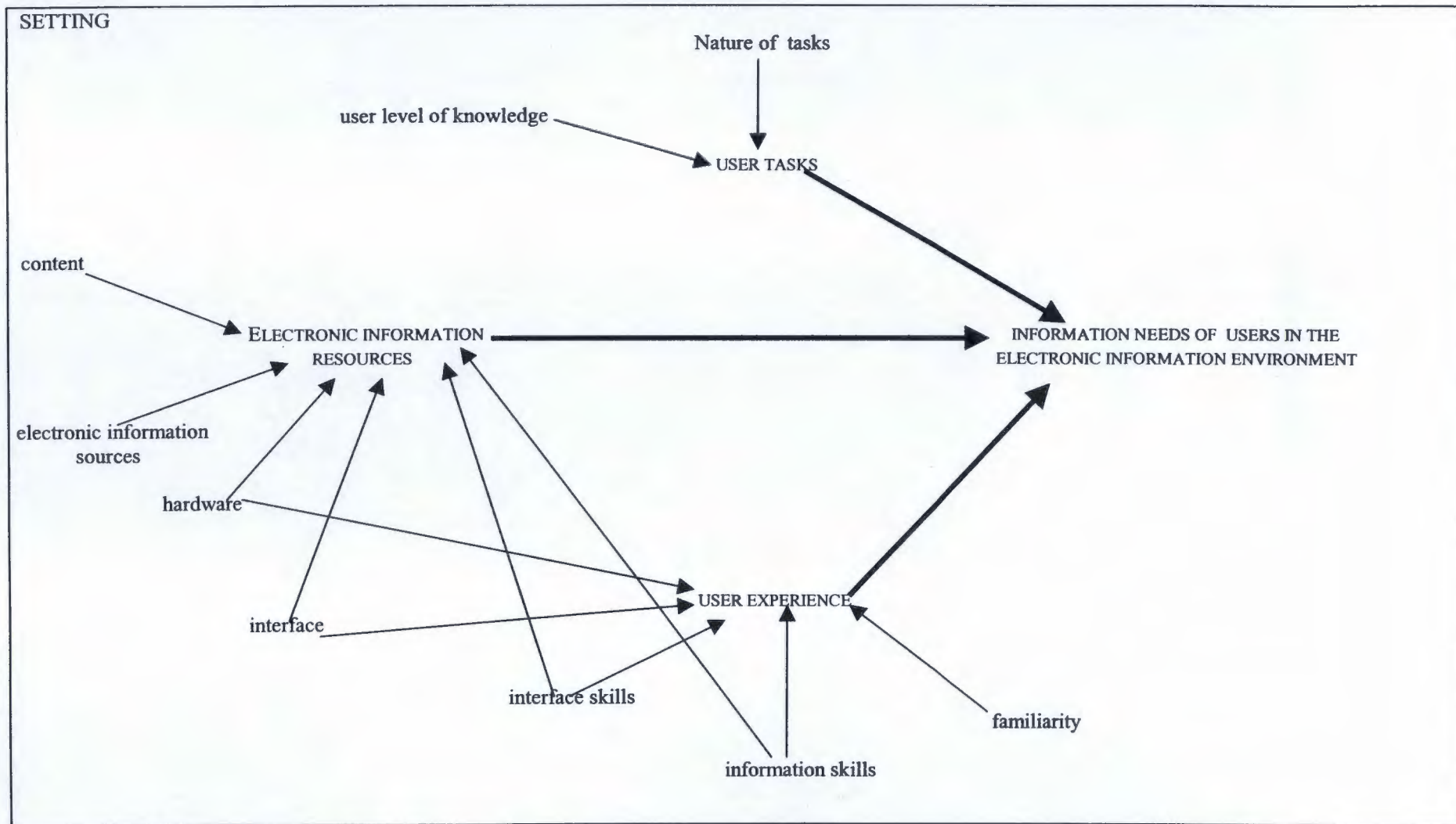
- Users’ prior experience affects “Electronic information resources” as users’ perceived accessibility largely depends on prior experience that users have of the interfaces of the computing facilities and electronic information sources (Hertzum and Pejtersen, 2000). Users’ perception of accessibility is as strong as the actual state of accessibility in determining users’ attitudes and interaction with the computing facilities and electronic information sources. According to Abels, Liebscher and Denman (1996, p. 149) “accessibility is a relative concept on which individuals hold personal opinions. Thus, accessibility cannot be determined solely by physical measures alone but must include measures of user perceptions...”. In their research, the authors found that lack of perceived accessibility determines use or non-use of electronic networks (1996, p.149). Similarly Culnan (1985, p. 302) maintains that “Perceived accessibility, or expected level of effort required to use a particular information source will influence an individual to select a particular source from among the range of alternative sources”. Culnan further cites Wilson to have suggested that non-users of a particular information source are likely to underestimate the existence of potentially useful information (1985, p. 306). This applies to infrequent users too. The point is that without prior experience even the existing information carrier could be considered non-existent by users, whether that is reasonable or not. Poole also notes that perceived accessibility of information channels is a function of user prior experience and awareness (1985, p. 74).

These influences that the elements of the model exert on each other directly or indirectly affect the state of the elements in each setting and the nature of the influences that each puts



on the nature of the information needs of users in an electronic environment. The elements and their dimensions and the relationships of the model can be presented graphically as follows (Figure 5). Figure five shows that the nature of tasks that a user encounters and the current state of knowledge structures of the user when encountering tasks to be dimensions of “user tasks”; the electronic system hardware, the electronic system interface, the electronic information sources, and the electronic information content residing in the sources as dimensions of “electronic information resources”; and users’ interface skills with the system in use, users’ information skills, and familiarity of users with electronic information systems as dimensions of user’s prior experience. The figure also shows that “user tasks”, “electronic information resources”, and user experience directly influence the nature of information needs of users. It is also shown that there is a reciprocal relationship between “electronic information resources” and the user’s prior experience in the context of information needs of users in the electronic information environment. The figure further shows that the dimensions of interface skills and information skills from user experience and the dimensions of hardware and interface from electronic information resources are shown to be involved in this reciprocal relationship.

In conclusion, by approaching the identification of elements and their relationships from the perspective of factors affecting information needs of users, this phase of the research has identified “user tasks”, “electronic information resources” and user experience as its elements. It also has identified a set of relevant relationships of the elements. The identified elements and the relationships listed above generate information needs that users’ experience in the electronic information environment. More specifically it is the nature of “user tasks”, the state of the “electronic information resources” and the level of users’ prior experience that will give us the clue as to what sort of information needs that users’ of a given information setting are bound to experience. Understanding information needs of users in the electronic information environment requires understanding of the nature and contributions of each of these elements towards the specific information needs that users’ experience in a given setting.



**Figure 5. Dimensions and the relationships of the elements of the model of the information needs of users in the electronic information environment**



Before concluding this chapter, it seems in order to raise the question of stance of this research regarding the evaluation of the validity of the model. As mentioned in Chapter two of this thesis, building a model usually involves validating the model alongside the identification of the component elements of the model and their relationships. However validating a model is a lengthy and demanding process. This implies that in research like the current one, given the time constraint, it is not possible to go through the process of validating the model. Validating a model requires careful decision making related to issues such as where to test, when to test, on whom to test. It may also require one to wait and see how well the model has served the purpose it has been build for. Therefore, due to mainly the time constraint, validating the model of the information needs of users is not considered to be feasible in this research. Instead, the evaluation aspect is included in the recommendation section of this thesis for future research.

#### **4.4 Summary**

This chapter has presented the process followed in identifying and selecting component elements and their relationships of the model developed in this research. Factors affecting content and non-content needs of users in the electronic information environment are the elements selected to represent the essence of information needs of users in the electronic information environment. "User tasks" that give rise to content needs when individuals' current state of knowledge is less than what they need to have in order to perform tasks are identified as factors affecting the content needs of users. The factors identified as influencing non-content needs are the state of electronic information resources and the state of users' experience in using electronic information resources. Factors affecting access to electronic information are considered as factors determining the non-content needs of users on the premise that the same factors apply in both. "User tasks", the state of electronic information resources, and users' prior experience are shown to have a direct influence on the nature of the information needs of users in the electronic information environment while reciprocal influences take place between the state of electronic information resources and users' prior

experience. The state of electronic information resources involves the states of the physical availability and physical accessibility hardware; the physical availability, physical accessibility, and ease of use of software in use; the physical availability and physical accessibility of electronic information sources; and the physical availability and physical accessibility of the electronic information content. The state of users' prior experience involves skills and familiarity of end-users in using the existing interfaces of the computing facilities; skills and familiarity of end-users in using interfaces of computing facilities in general; skills and familiarity of end-users in using the interfaces of existing electronic information sources and networks such as CD-ROM, online databases, and the Internet accessible for use; and information literacy levels of end-users. The nature of "user tasks" involves the nature of tasks or activities that individuals have to perform and the current state of knowledge of individuals when encountering tasks. The selected elements and their relationships have been identified from LIS literature.



## CHAPTER FIVE

### THE MODEL OF INFORMATION NEEDS OF USERS IN THE ELECTRONIC INFORMATION ENVIRONMENT

#### 5.1 Introduction

This chapter presents the model of information needs of users in the electronic information environment. It mainly discusses in what ways does each variable of the model influences which aspects of information needs of users in the electronic information environment. It also provides the graphic presentation of the model and description of its structure showing how the elements and their relationships interact in creating information needs of users in the electronic information environment. However, this chapter does not discuss the degree to which each variable or its dimensions influence information needs of users in the electronic information environment. This is because determination of the degree of influence of each variable is beyond the scope of the model. The issue of degree of influence of each variable is put forward for further studies in the recommendation section of this thesis.

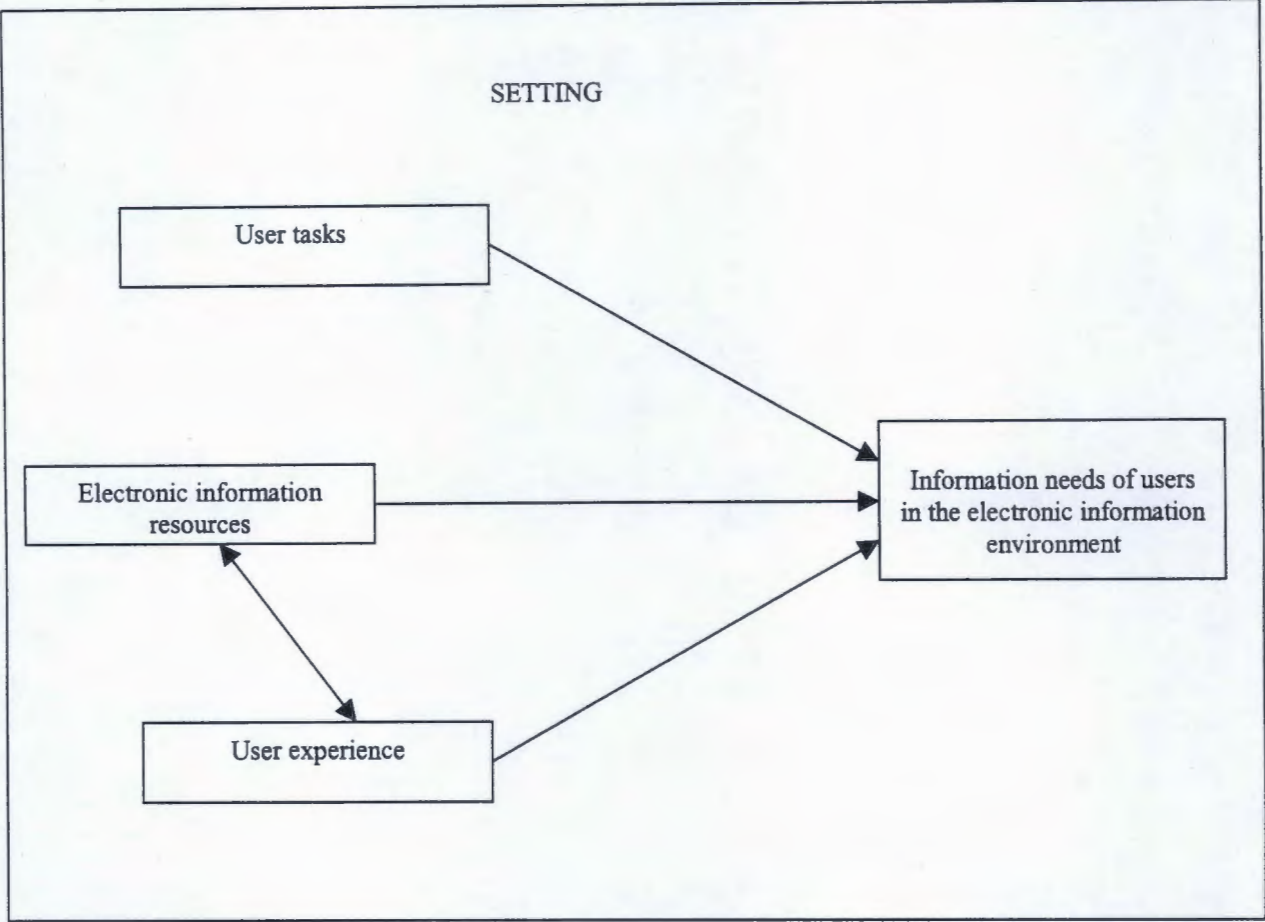
As shown in Chapter four, the model of information needs of users in the electronic information environment presented here is composed of three elements, namely, "user tasks", the state of "electronic information resources" and the level of users' prior experience with "electronic information resources". The common feature of these elements is that they are all factors affecting the information needs of users in the electronic information environment. Information needs of users here reflect content and non-content aspects. The content aspect of information needs refers to users' needs for facts, figures, views, ideas that are needed to fill in the gap in knowledge. The non-content aspect of information needs refers to how users need to have the relevant content be made available for their access and use. The non-content aspect of information needs is carrier-related because it arises from the nature of the carriers in use in each setting.

“User tasks” that lead to problem situations when the current state of knowledge of individuals is not adequate to execute the tasks are responsible for formation of content needs of users. The state of “electronic information resources” and level of users’ prior experience with “electronic information resources” are factors affecting the non-content needs of users. “User tasks”, the state of “electronic information resources” and the level of users’ prior experience with “electronic information resources” directly influence the nature of information needs of users in the electronic information environment. The state of “electronic information resources” and level of users’ prior experience also influence each other directly. Graphic presentation of the model is shown below (figure 6) where the elements and their relationships are depicted. The narrative description below discusses for which aspect of information needs of users in the electronic information environment that each element stands. The discussion also reflects why and how each element stands for the respective aspect of information needs of users in the electronic information environment.

## **5.2 “User tasks”**

“User tasks” are the first element of the model. They are presented in the model as a factor giving rise to content needs of users. “User tasks” are tasks or activities that users encounter on an everyday basis. However, “user tasks” here reflect more than the mental and/or physical activities that individuals perform in the course of their lives, including work related tasks. “User tasks” here also reflect the interplay between tasks or activities that individuals encounter and the current state of knowledge of individuals when encountering the tasks. It is the interaction between activities and the current state of knowledge that leads to problem situations, hence information content needs. Problem situations occur when an individual recognizes his lack of knowledge in understanding the nature and solutions of tasks or interests that he encounters in everyday or work lives. In the course of their life individuals often encounter tasks or pursue interests that they do not understand well and be able to execute. Users regularly find themselves in situations where what they know about the tasks and interest is short of what the tasks and their interests require for their execution. When individuals realize that what they





**Figure 6. The model of the information needs of users in the electronic information environment**

know is not enough to understand and execute the tasks at hand, they experience problem situations. It follows then that the nature and amount of information content needed are determined by 1) the nature of tasks and interests, and 2) the current state of knowledge that an individual has at the time of confronting the tasks or interests.

Each task or interest comes with its own specific type and amount of knowledge required for its execution. The nature of the content needs arising here comprised of facts, figures, and ideas that can help the individual to learn about the nature of the tasks, identify alternative ways of performing the tasks, and select the best alternative ways of performing the tasks in accordance with the values, expectations and requirements of the social and/or organizational and domain contexts in which the tasks are taking place.

The current state of knowledge of the individual also determines the nature and amount of information content needed because what is needed specifically is the knowledge that the individual is lacking in his current stock of knowledge or knowledge structures in relation to the tasks at hand. Individuals' knowledge structures are critical because individuals understand and appropriately address their situations by consulting their knowledge structures. The more adequate the stock of domain and general knowledge that a user has, the less chance he has facing gaps in knowledge, leading to requiring little external information content (external to the user) in order to perform tasks by him. Highly trained and experienced users need less information content in order to perform a given task than users with a lower training level and work experience in a given area. Because of the difference in stock of domain knowledge possessed by juniors and seniors, under normal circumstances seniors serve often as a source of domain knowledge and experience to juniors in the same field. Therefore, information content needs arise when what individuals know is inadequate for performing tasks at hand. The extent and nature of information content needed to resolve the gap in knowledge and be able to perform the difficult-to-perform tasks depend on how much the individual lacks for performing the tasks at the time of confronting the tasks.



Furthermore, the content needs are cognitive and subjective since problem situations arise from the current state of knowledge of each individual. They are also situational, since they arise from tasks of a social and/or organizational context of a given setting. The problem situations, and more importantly the information content needs, are not fully understood and are difficult to articulate by users until some interaction with potentially relevant information sources takes place. During the interaction, users gain a clearer understanding of the nature of the problem situations and the information content needed by them to resolve the problem situations. Consequently information content needs are generally non-specifiable and dynamic, too.

Therefore, tasks or activities that users have to perform and the current state of knowledge of individuals when encountering the tasks or activities give rise to information content needs of users. These are represented by the element “user tasks” in the model (figure 6).

### **5.3 The state of “electronic information resources”**

The need for information content discussed above means the need to resolve the perceived gap in knowledge by individuals and the need to be able to perform the tasks at hand. It is ultimately about acquiring and filling the perceived gap in knowledge for the purpose at hand. In this sense information needs are purposeful. One can argue that when this purposefulness is missing, the information seeking process is not initiated or seen through. Consequently, this filling of the gap in knowledge with information content is not determined by the existence of right information content, but also by other factors that equally determine whether the gap in knowledge is filled. In particular, the filling of a perceived gap in knowledge involves the nature of information channels and sources in which information content always resides and with which users have to interact first in order to get to the information content needed to fill their perceived gap in knowledge. If this interaction is not carried out effectively, the required content remains out of the reach of the individuals, leaving the gap in knowledge unresolved and the task not performed. Thus, a set of specific user needs also arises in connection with the state of

electronic channels and sources and the nature of interaction that users could have with the channels and sources in each setting. This forms the non-content needs or carrier-related needs of users.

The factors that give rise to carrier-related needs can be organized as “electronic information resources” and level of users’ prior experience in accessing and using the “electronic information resources”. These are shown as elements on their own in the model above (figure 6). Each is responsible for specific aspect of the nature of the carrier-related needs of users.

“Electronic information resources” in this model refer to whether the relevant computing facilities and electronic information sources such as CD-ROMs exist in a given setting for use as well as whether these resources are actually available for interaction by the users of that setting, which could be affected by inconveniences such as physical distances, user lack of knowledge, restricting policy and others that render the facilities and the sources non-existing from the point of view of the users. Therefore, “electronic information resources” here consists of the state or degree of physical availability of the computing facilities (including the interface) and the electronic information sources, and physical accessibility of the facilities (including the interface) and sources and the content therein.

The states of physical availability of the computing facilities and electronic information sources in a given setting determine the nature and amount of the electronic information content available to fill the gap in knowledge of users of that setting. For instance, the processing power and storage capacity of the available workstations for users’ to use limit the amount and the nature of the electronic information content that users can access and use in their effort to fill in their gap in knowledge. This is so because the capacity of software program which could be loaded for users’ to use to access information content from electronic sources and networks depends on the processing power of the computing facilities available in each setting (Marchionini, 1995). Furthermore, the physical availability of appropriate reader software determines whether



content in a format that requires a particular reader software is acquired and used for resolving a gap in knowledge. Depending on the capability of the existing computing facilities, therefore, what is suitable and appropriate content for resolving users' gap in knowledge in each setting is limited to what can be accessed and used in the setting using the facilities. In other words, the state of the physical availability of the computing facilities and electronic information sources in a given setting influences the nature and amount of content that could be acquired by users in order to fill their perceived gap in knowledge or what would be appropriate to fill users' gap in knowledge in that setting. Therefore, the state of the physical availability of the required computing facilities and electronic information sources in each setting generates specific carrier-related needs in users. The needs are carrier related because they arise in relation to the state of the carrier. The specific nature of the carrier-related needs generated from the state of the physical availability of the computing facilities and electronic information sources in each setting is that users need the content to be made available within the constraints of the state of physical availability of the computing facilities and electronic information sources in each setting so that accessing and using required information content is still possible. As argued in Chapter four of this thesis, in general, convenience of access and use have been shown to be critical factors of users' choice of information products and services while the LIS literature has specifically shown that ease of accessibility is the overriding factor in users' use of information sources. One can further add that high levels of physical availability of the computing facilities and the electronic information sources lead to low users' needs related to the physical availability of the facilities and the sources in each setting. Thus, the state of the physical availability of the required computing facilities and the electronic information sources contributes to the nature of information content needed by users to resolve their gaps in knowledge in the electronic information environment.

Similarly, the degree of the physical accessibility of an available carrier in a given setting (i.e., the electronic information channels and sources) influences the amount and the nature of electronic information content that could be acquired to fill the gap in knowledge and hence perform tasks in that setting. A workstation with appropriate CD-



ROM title could be in existence in a given institution. However, users of that institution may not have adequate physical access to the CD-ROM for reasons like policy in relation to the use of CD-ROM, or the inconvenience of the location of the CD-ROM workstation, which will affect negatively the physical accessibility of the content of the CD-ROM. The same can be said of the Internet in a setting that has the Internet connection. The cost of accessing the Internet, or an inadequacy of infrastructure to access the Internet will limit the physical accessibility of the Internet. This consequently restricts the access to the information content available through the Internet. The cost of Internet connection (access fees and cumulative connect time) "interferes with the convenience of browsing freely without undue concern for how long one can stay on a screen" (Nahl, 1998, p.364). Depending on the physical accessibility of the computing facilities and the electronic information sources, users are left with only content that is physically accessible in their setting for filling their gaps in knowledge. In other words, the state of physical accessibility of the computing facilities and electronic information sources in a given setting influences the nature and amount of content that could be acquired by users in order to fulfill their perceived gap in knowledge or what would be appropriate to fulfill users' gap in knowledge in that setting. This means that the specific state of the physical accessibility of the computing facilities and electronic information sources leads users to have specific preferences and needs regarding how the information content has to be made available for their access and use. Thus, the nature and level of the physical accessibility of the existing computing facilities and electronic information sources give rise to given types of carrier-related needs. As in the cases of needs arising from the state of the physical availability of the computing facilities and electronic information sources, the nature of users' needs generated by the state of the degree of physical accessibility of the computing facilities and electronic information sources in a given setting is to have the electronic information content made available in a way that fit the existing degree of physical accessibility so that users still access and use relevant content in resolving problem situations arising from tasks. To have access to and use the information content in the CD-ROM, users need the content to be accessible within the constraints of the physical accessibility of the facilities and the sources in their setting. A high degree of physical accessibility of the computing facilities and electronic



information sources in a given setting leads to less physical accessibility related needs of users. Therefore, the degree of physical accessibility of the carrier influences the nature of the electronic information content needed by users to fill in the gap in knowledge in the electronic information environment.

The nature and amount of electronic information content users need for filling their gap in knowledge also arises in relation to how difficult or easy and capable the existing interfaces of the computing facilities and electronic information sources are. This is because the interface is the point of contact between users and the electronic information when users seek relevant information content. How learnable, usable, and satisfying a system is depends on the interface with which users come in contact with the system. Search software imposes particular requirements of operation. Factors inherent in the interface program could make it easier or more convenient for the user to handle the requirements, such as expressing his command, given that the commands had to follow a specific syntax (Nahl, 1998, p. 316). Difficult-to-use or poor quality interfaces render the content residing in the electronic information channels and sources practically non-existent. Poor capability of the interfaces could hide what is available which reduces the accessibility and use of the available content. Low capability of interface allows one to browse, search, download and view only a limited type of electronic information content from the Internet, for example. An appropriate CD-ROM title on a given subject area could be rendered virtually non-existent if it is difficult to interact with the content therein in order to resolve problem situations arising from tasks. Only content that is possible to access and use within the existing ease of use and capabilities of the interfaces in a given setting can fill the gap in knowledge of users of that setting. In other words, the states of the interfaces to the computing facilities and electronic information sources and the content therein in a given setting influence the nature and amount of content that could be acquired by users in order to fill their perceived gap in knowledge or what would be appropriate to fill their gap in knowledge in that setting. Thus, the nature of the interfaces of existing carriers in a given setting gives rise to a given type of carrier-related need in users of that setting. Again users' needs in relation to the ease of use and capability of interfaces are to have the content in such a way that the acquisition

of content is possible within the constraints of the existing interfaces, both in terms of capacity and sophistication in use. Specifically the less capable or difficult-to-use the interfaces are, the higher the interface-related needs of the user will be in order to be able to access information content in the electronic information sources. Therefore, the state of ease of use and capabilities of interfaces of existing carriers influence the nature of information content needed to resolve the gap in knowledge by users in the electronic information environment. In this model, ease of use refers to the ease that users feel in learning and using the interfaces of the computing facilities and electronic information sources. The capability refers to the features provided by the interfaces in supporting information seeking in the electronic information environment.

The physical availability and accessibility of the content itself is an issue again in respect of which users develop specific needs depending on the state of the physical accessibility of content from the electronic information sources. Physical availability and accessibility of content here refers to whether the needed content is within the physical reach of users for consultation and whether the content is within the reach of users' intellectual interaction and understanding. The content in a given CD-ROM could be rendered virtually unavailable if it does not contain enough detail to fill in the felt gap in knowledge. Bibliographic databases without the support of full text are examples of this nature of unavailability because "end users are ultimately concerned with primary information and display of full text or images is crucial to the examination of results"(Marchionini, 1992, p. 159). Similarly, if the content is presented or discussed beyond the comprehension level of users, for example, in terms of language used and the depth of treatment of the issues, then, the content becomes inaccessible and practically unavailable. The way the content is organized and made available affects the way that information seekers are able to access it. If the content is not acquirable within the constraints of the setting, then the gap in knowledge remains in effect. In other words, the state of physical availability and accessibility of the electronic information content in a given setting influences the nature and amount of content that could be acquired by users in order to fill their perceived gap in knowledge or what would be appropriate to fill their gap in knowledge in that setting. Thus, the state of the physical availability and



accessibility of content in the existing computing facilities and electronic information sources, gives rise to given types of carrier-related needs of users in the electronic information environment. As in the earlier cases, users' needs arising from the state of physical availability and accessibility of content from available electronic information channels and sources are that the content be made available in physically acquirable, graspable, interactable, and usable form within the constraints of the users' information environment. This is so because it will allow users to access and use the content of desire to resolve the gaps in knowledge that they are experiencing. A higher degree of physical accessibility of content in the electronic information channels and sources leads to less physical accessibility related needs of users. In a setting where the accessibility of full text electronic information sources are low, one of the required features of the contents of CD-ROMs in that setting would be that they are full text and are accessible and usable within the constraints of the carriers of the setting. Therefore, the state of physical accessibility of content from the electronic information channels and sources influences the nature of content needed by users to fill their gap in knowledge in electronic information environment.

The state of the "electronic information resources" in a given setting also influences the level of users' experience. For example, the levels of physical availability and accessibility of the computing facilities and electronic information sources determine the frequency of access and use of the resources which is the key for users to gain experience. Training received on how to use the computing facilities and the electronic information sources has to be followed by actual practice which requires adequate availability and accessibility of the electronic information resources. Intensity of use that leads to increase in skills and familiarity of electronic information resources currently in use as well as similar systems depends on the degree of physical availability and accessibility of the electronic information resources.

#### **5.4 The level of user experience**

To actually interact with the physically available and accessible carrier and content, users

must have appropriate skills and familiarity in interacting with the carriers and the content therein. Without the required skills to operate and interact, even the ideal physical availability and accessibility of carriers and content amount to nothing. If the required skills to operate and interact with the existing carriers and the content therein is lacking, then filling the gap in knowledge with relevant content from the existing carriers cannot take place. The level of their skills leads users to need information content to be made available in a particular way in order for them to fill their gap in knowledge. In this way the level of users' prior experience with the current system or similar systems gives rise to particular carrier-related needs in each setting. This is represented by the level of users' experience in interacting with the carrier and content in the model. In this model, level of users experience specifically refers to the level of users' skills in using the features of the interfaces to perform the information seeking activities in the electronic information environment. These include a level of basic skills in interacting with the interfaces such as beginning and ending, reading from the screen, scrolling and paging, using keyboards or mouse, selecting menus, recognizing differences between prompts and commands, getting help, managing windows and establishing network connections. It also includes higher level skills such as customizing system and using most of the features of the interfaces. Familiarity with databases' organization (indexing), scope and coverage (subject domain and sources of content included), and structure (fields and records) are part of user experience discussed here. Skills also include information literacy skills such as recognition of one's information needs, evaluation of feedback from the system, synthesis of search results, attitudes of information seeking, awareness of existing information sources and services, and confidence that users should have in order for them to make the best of existing computing facilities and electronic information sources. Experience is assumed to be acquired by users through actually interacting with the interfaces of the computing facilities and electronic information sources and through training in how to interact and extract information content from electronic sources.

The levels of users' skills in interacting with the interfaces and the content in the electronic information sources determine the nature and amount of content that could be



acquired by users in order to fill their perceived gap in knowledge. The level of experience of the users with the interfaces determines the specific level at which users can interact with the computing facilities and electronic information sources and hence the degree of probability of the users in acquiring the content from existing sources. For example, accessing and using information content from the Internet requires one to have skills in selecting appropriate search engines, formulating queries, browsing, downloading, printing, and viewing of relevant Internet documents. Composing valid Boolean search statements for online searching depends on an accurate understanding of both the semantic and logical features of the operation (Nahl, 1998, p. 323). Contents that can be accessed and used with the existing level of user skills in interacting with the existing interfaces of the computing facilities and electronic information sources will reach the knowledge structures of the users to resolve the perceived gap in knowledge. In other words, the levels of skills in interacting with the interfaces of the existing computing facilities and electronic information sources and the content therein possessed by users of a given setting influence the nature and amount of content that could be acquired by the users in order to resolve their perceived gap in knowledge or what would be appropriate to resolve users' gap in knowledge in that setting. Thus, the level of users' experience in interacting and manipulating the computing facilities and electronic information sources as well as users' level of information literacy skills give rise to a particular set of carrier-related needs in users. Users' needs arising from their level of their experience are that the information content to be made available within their current level of skills of accessing and using the existing interfaces as well as the level of their information literacy skills. This will allow users to acquire the needed content to resolve their gap in knowledge from electronic information sources existing in their setting. Specifically, the higher skills and familiarity users have with the interfaces of the computing facilities and electronic information sources currently in use, the lower their experience-related needs. Consequently the level of users' prior experience in accessing and using interfaces of the computing facilities and electronic information sources influences the nature of information content that is needed to be acquired to resolve users' gap in knowledge in the electronic information environment.

Furthermore, the level of user experience influences the state of “electronic information resources” because perceived accessibility of the computing facilities and electronic information sources is determined partly by users’ feelings arising from their skills and familiarity. Perceived accessibility is what users base their decisions on regarding selection and use of information sources whether their perception is consistent with the reality or not.

## **5.5 Summary**

The graphic presentation and narrative description of the structure of the model presented above show that information needs of users in the electronic information environment are the result of and determined by “user tasks”, the state of “electronic information resources” and level of users’ prior experience with “electronic information resources”. Depending on the state of each of these elements of the model, users experience specific information needs that have both a content and a non-content nature. Each element contributes to the nature of information needs that users face in a given setting in a unique way. Each of the elements directly contributes to the nature of information needs, while there is a reciprocal influence between the state of “electronic information resources” and level of users’ prior experience with “electronic information resources”. The content needs for facts, figures, and ideas are to resolve the gap in knowledge that users realize when what they know about a given task is less than what it takes to execute it. Non-content needs are carrier-related and are ultimately to ensure that the relevant content reaches the knowledge structures of users to resolve users’ gaps in knowledge. Content needs are triggering needs around which the non-content needs are revolving to ensure that content reaches the knowledge structures of users to resolve the gap in knowledge. The essence of the information needs that users face accordingly are to have relevant content to resolve the gap in knowledge and to have the relevant content made available within the constraints of existing electronic information resources and personal experiences of the users. This will ensure that the relevant content reaches the knowledge structures of users to resolve the gap in knowledge.



## CHAPTER SIX

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

#### **6.1 Introduction**

This chapter presents a summary of the research findings and conclusions and recommendations made based on the findings. The first section of the chapter presents the salient points and findings of the research. The second section of the chapter presents a concluding discussion of the research. Finally recommendations to implement the findings of the research and to further the research are given.

#### **6.2 Summary of the findings of the research**

This section presents a summary of the findings of the research. However, before presenting the summary of findings, the section gives an outline of the research problem and its background, the proposed intervention to address the research problem, the research questions raised to guide the research, the aims and objectives of the research, and methodologies employed in the research.

##### **6.2.1 Background to the research problem**

The research started by recognizing that to many scholars research into information needs has been unsatisfactory in informing information systems development and in improving the overall understanding of the concept of information needs. While some of these scholars believe that the problem is the use of inappropriate methodologies, others argue that it is the lack of a unifying theory that is the reason for the unsatisfactory progress in information needs research. However, this research argued that the basic reason for the unsatisfactory progress in research into information needs has been the use of inadequate conceptualization of information needs. Conceptualization in this research refers to

definitions and/or assumptions regarding the essence of information needs. According to this research, conceptualization is the root cause of the unsatisfactory progress because it determines the identification of research focuses and methodologies in use in information needs research. Conceptualization of a phenomenon under study points out in broader terms the issues and the aspects of the phenomenon that need to be studied. Clearly identified research focuses in turn facilitate the selection of appropriate research methodologies to use. In other words this research implied that inadequate research focuses and methodologies arising from inadequate conceptualizations have been the causes for unsatisfactory progress in information needs research observed by many researchers in the field. It was also shown that theory building requires a clear and valid conceptualization of the phenomena under consideration.

The research further identified two different conceptualizations of information needs in use in information needs research in LIS. These are system-oriented and user-oriented conceptualizations. These two conceptualizations have their own assumptions, research focuses and associated methodologies. The conceptualizations have provided the knowledge that the LIS profession has regarding information needs so far. However, none of these has been universally accepted by information needs researchers being satisfactory. Both conceptualizations have attracted criticisms. Consequently, the inadequacy of the existing conceptualizations has resulted in information needs research taking place without a universally accepted conceptualization, research focuses and methodologies to guide it. The inadequacy of the conceptualization has left the research without a uniformly employed research framework that would have helped to build theories in the area.

In addition to agreeing that none of the existing conceptualizations has been widely accepted, this research argued that these conceptualizations specifically have failed to reflect some of the essential nature of information needs. The characteristic features of information needs that have not been duly reflected by the existing conceptualizations are that:

1. information needs are composed of content and non-content elements in an



- inseparable way, and
2. information needs are influenced by the information environment, namely, print and electronic information environment, where they are met.

Consequently, the research concluded that research into information needs requires sound conceptualization and associated research focuses and methodologies in order to achieve the desired progress. The research specifically argued that an alternative way of looking at the essence of information needs that could lead to the identification of adequate research focuses and approaches is needed. An adequate alternative conceptualization will lead to the identification of adequate alternative research focuses and associated research methodologies. In this way, the unsatisfactory progress in research into information needs could be addressed.

#### **6.2.2 Statements of the research problem**

The research argued that an alternative conceptualization of information needs which is capable of providing alternative ways of looking at the essence of information needs of users and pointing out associated alternative research focuses and research methodologies is needed. To this end the research proposed developing a model of the information needs of users and to identifying assumptions and premises that could help develop the alternative conceptualization.

Developing a model of information needs was chosen because it has the potential to help to develop the kind of conceptualization that the research into information needs requires. The first potential application of models in this connection is that they help in specifying what elements constitute the phenomena they model. The second potential use of models is that they help identify research focuses for studying the phenomena they model. With clearly identified research focuses, selection of appropriate research methodologies is facilitated. The third potential of models is that they facilitate advancing and developing theory about the phenomena they model. All these potential uses are what were hoped the alternative conceptualization would achieve.

Identifying and discussing relevant assumptions and premises regarding information needs and related concepts were also necessary to develop the alternative conceptualization sought in this research. Discussion of assumptions and premises related particularly to the nature of information needs that have been argued in this research as being lacking in the existing conceptualizations, was essential for a number of reasons. First, there was a need to establish that information and information needs have been recognized in LIS literature as existing inseparably as content and non-content. It was also essential to establish that there has been supporting evidence that the physical form in which information content is made available for users' access and use influences their information needs. What constitutes the content and non-content aspects of information and information needs were also needed to be specified in order to fully understand them. Finally, discussion of assumptions and premises were also needed to complement the model. The model alone cannot communicate everything about the essence of information needs as well as all the issues that need to be known for a full understanding of the model. Thus, the model and the assumptions were called for to complement each other in generating the alternative conceptualization to address the shortcomings in information needs research. The research further argued that with a model and relevant assumptions of information needs, the issues of conceptualization, research focuses and methodologies, and theorization can all be addressed step-by-step in an integrated manner.

Taking in to consideration that the information environment influences the nature of information needs of users, a specific information environment had to be selected as a context to develop the model. Therefore, considering the growing importance of the electronic information environment, the research has developed a model of the information needs of users in the electronic information environment.

### **6.2.3 Aims of the research**

The research aimed at developing a model and identifying assumptions that could:

1. help in gaining more insight into the information needs of users



2. allow one to develop an alternative conceptualization of the information needs of users in the electronic information environment
3. help improve the research approach in information needs research
4. contribute towards theorization in information needs of users in the electronic information environment

#### **6.2.4 Specific objectives of the research**

To answer the research questions, the research maintained the following specific objectives:

1. To identify the factors affecting the content and non-content needs of users in the electronic information environment as presented in the literature. This objective covers the identification of factors affecting content needs and non-content needs.
2. To identify the influence of each factor in creating information needs of users in the electronic information environment
3. To construct a model of the information needs of users in an electronic information environment using the identified factors and their relationships
4. To identify assumptions and propositions regarding information needs and related concepts to be considered or emphasized in the alternative conceptualization
5. To put forward recommendations and suggestions on how to employ the model and the related assumptions and premises to contribute towards addressing the shortcomings in information needs research identified above.

#### **6.2.5 Research questions**

To guide the research, the following research questions were posed and addressed:

1. What variables and relationships among them represent the essence of information needs of users in an electronic information environment?
2. How do these variables and their relationships influence the information needs of users in an electronic environment?
3. What assumptions and propositions regarding information needs and related

concepts should be considered or emphasized in the alternative conceptualization of the information needs of users?

4. In what specific ways can the model and the assumptions (that is, the alternative conceptualization) be used to address the problems discussed above?

#### **6.2.6 Scope of the research**

The scope of the research was limited to developing a model of the information needs of users and to the identification of relevant assumptions and propositions regarding information needs and related concepts.

#### **6.2.7 Methods of data collection**

The research method used to collect data was a survey of existing literature of LIS. The secondary data from the literature of LIS was used to identify the variables to develop the model and identify the assumptions and premises. The survey of the literature which was used to develop the model, focused on identifying those factors affecting the information needs of users. These factors formed the component elements of the model. The survey of the literature also identified assumptions and premises that are to be used in conjunction with the model to develop the conceptualization of information needs that was proposed as an intervention to address the research problem.

#### **6.2.8 Summary of the findings of the research**

The summary of the findings below are organized according to the research questions that were raised and addressed by this research.

In relation to the research question one, namely, what variables and relationships among them represent the essence of information needs of users in an electronic information environment, the model has identified a set of variables and their relationships that represent the essence of information needs of users in electronic information environment. *Accordingly, the model has identified the nature of user tasks, the state of*



*electronic information resources, and the level of user experience as variables representing the essence of information needs in an electronic information environment.* These elements are factors that give rise to information needs in the electronic information environment.

To identify the variables, the research chose to look at the essence of information needs from the perspective of factors giving rise to information needs in the electronic information environment. Consequently to identify the variables representing information needs as seen from the perspective of factors giving rise to them, the research surveyed the literature in relation to factors affecting the content and non-content aspects of the information needs of users. Factors affecting both content and non-content needs were sought because of the view or assumptions of the research that information and information needs occur as content and non-content inseparably. As a result, the research has identified tasks or activities that individuals encounter in life give rise to content needs. Tasks or activities give rise to content needs when the current state knowledge of the individuals is not enough to understand and execute the tasks. Availability of workstations, accessibility of workstations, ease of use of interfaces, and users' prior experience with electronic information systems have been identified as factors giving rise to non-content or carrier related needs of users in the electronic information environment. The factors giving rise to non-content or carrier-related are known in the LIS literature as factors affecting access and use of electronic information. However, in this research these same factors are considered to give rise to the non-content or carrier-related needs of users in the electronic information environment.

Furthermore, through the process of specifications, the factors giving rise to both aspects of information needs are reorganized in order to serve as appropriate variables of a model. As a result, the factors are organized and named as "user tasks", "state of electronic information resources", and "level of user experience". "User tasks" refer to activities in life which lead to gaps in knowledge when the individual's current state of knowledge is not adequate enough to understand and execute the activities. Consequently, the attributes of user tasks are tasks or activities that individuals encounter in every day life and the level of knowledge that the individuals' possess at the time of



encountering the tasks. When an individual's current level of knowledge is inadequate he or she experiences gaps in knowledge, hence a need for facts, figures, and advice, which is content. The term "state of electronic information resources" refers broadly to the prevailing capabilities of the electronic carriers in facilitating access and use of content in each setting. The state of electronic information resources is a function of the degree of the physical availability and accessibility of hardware; the physical availability, accessibility and ease of use of the software in use, the physical availability and accessibility of electronic information sources, and the physical availability and accessibility of the electronic information content. These are the attributes of state of electronic information resources. The term "level of user experience" refers broadly to the level of prevailing abilities of users in accessing and using the existing electronic carriers and the content therein in each setting. The level of user experience is determined basically by the level of skills possessed by users in using interfaces of existing computing facilities and electronic information sources as well as their information literacy skills. These are the attributes of the level of users experience. Therefore, these three variables and the relationship they enter into in the context of giving rise to information needs, represent the essence of information needs of users in electronic information environment.

In relation to research question two, namely, which of the variables and their relationships influence which aspects of the information needs of users in electronic information environment, the research has shown that each of the variables of the model influences the nature of information needs of users in the electronic information environment in a distinct way. *Accordingly, the user tasks have been shown to determine the content aspect of the information needs of users.* It is shown that life activities or tasks lead to problem situations, hence information content needs, when what individuals know is not adequate to understand and execute the tasks. Such situations create gaps in knowledge that should be filled with relevant content. In this way each task and current state of knowledge of individuals determine what specific facts, ideas, and concepts that individuals need on an everyday basis. *The state of the existing electronic information resources in each setting and the users' experience in interacting with the resources have also been shown to influence the non-content related aspect of information needs*



*of users. The state of electronic information resources and user experience with the resources influence how users need to have the relevant content (namely, facts, figures, ideas, relevant to resolve felt gaps) made available for their access and use.* More specifically, the capabilities of the existing electronic information carriers in allowing access and use of electronic content influence how users need the content to be made available for their access and use in each setting. For example, the processing capacity of existing workstations limits the type and amount of electronic information content that users of a given setting could have access to. The users, therefore, need a content that is accessible and usable within the limits of the capabilities of the existing workstations in order to fill their gaps in knowledge. In this way, the capabilities of the existing electronic information resources in a given setting partly determine the nature and amount of electronic content which will be accessible and usable to users of that setting. Users' experience in interacting with the electronic carriers for the purpose of accessing and using electronic information content residing in the carriers also influences the nature of the content which should be made available in each setting. The current level of users' skills in manipulating the existing carriers in each setting puts limits to the nature of the content that the users can access and use. If a relevant content resides in a carrier that requires skills of access and use beyond what a given user currently possesses, then the content cannot be used to resolve the user's felt gap in knowledge. Only that content within the reach of the current users' skills can be acquired and processed to resolve users' gap in knowledge. Therefore, in these ways the three variables or elements of the model directly influence the nature of information needs of users in the electronic information environment.

*The state of electronic information resources and level of user experience also influence each other.* The availability and accessibility of existing electronic information resources influence the level of user experience because users' experience depends on the frequency and length of time that users interact with existing electronic information resources. User experience also influences the state of electronic information resources since users' experience influences users' perception of the state of electronic information resources. As pointed out in Chapter four of this thesis, as far as users are concerned,

their perceptions whether correct or not of the state of electronic information resources are as relevant as the actual state of the resources.

The model, however, has not shown the degree to which each variable or its dimensions influence the information needs of users in the electronic information environment. The determination of the degree of influence that each variable or its dimensions have is one of the listed areas for further study at the end of this chapter.

In relation to research question three, namely, what assumptions and propositions regarding information needs and related concepts should be considered or emphasized in the alternative conceptualization of information needs of users, the research has identified a set of assumptions and propositions regarding information needs and related concepts. The research focused particularly on identification of assumptions about the nature of information needs that this research has argued to have been undermined by the existing conceptualizations. Accordingly, the research has identified and discussed three core assumptions that should be emphasized in the alternative conceptualization developed in this research. The core assumptions are that:

1. *information exists as content and carrier inseparably*
2. *information needs are composed of content and non-content nature inseparably*
3. *the physical form or the carriers in which information content exists influences information needs*

These assumptions are the distinguishing features of the proposed conceptualization of the information needs of users. The core assumptions are identified and discussed in Chapter three of this thesis in detail for two reasons. They are identified first to show that there is supporting evidence in the literature that information and information needs exist as content and non-content and that the physical form in which information content is made available influences information needs. It is, therefore, logical to argue that these assumptions be reflected in the conceptualization of information needs. Second, such a discussion was needed to elaborate on the relevant nature of information needs as the model alone cannot tell everything about the nature of information needs that is intended to be reflected in the alternative conceptualization.



The research has also discussed other assumptions that are important to understand the model developed by the research. These assumptions relate to the features of the electronic information environment, information use and users and the physical setting of users. The assumptions are to be used along side the model in order to provide an alternative conceptualization of information needs. In this research the electronic information environment is where the desired information content is sought and catered for by means of content from electronic carriers. The term "setting" is understood to mean the specific physical setting where users live or work and in which they seek and meet their information needs. The assumption regarding the "use" of information adopted in this research consists of the acts of physically interacting with information sources, going through the sources and consulting the intellectual content aimed at receiving information content for filling felt gaps in knowledge.

In relation to research question four, namely, in what specific ways can the model and the assumptions identified be used to address the problems in information needs research, the research has identified and recommended different specific ways that the model and the assumptions can be used. The specific ways that the model and the assumptions can be used are organized in the following areas: developing an alternative conceptualization, developing research approaches, and contributing towards theorization in information needs.

#### **6.2.8.1 Developing an alternative conceptualization**

The major purpose of constructing the model and identifying assumptions and premises related to the relevant nature of information needs has been to address the shortcomings in information needs research by developing an alternative conceptualization. As a result the model and the assumptions and premises have been used to develop the alternative conceptualization. The conceptualization is presented below.

The alternative conceptualization states that information needs are those things which individuals need to resolve gaps in knowledge. In order to resolve gaps in knowledge, individuals' needs for information include both content and non-content aspects of

information. This is because information exists as a content and non-content resource. Information content always resides in some carrier for its storage, access, and use. Information content refers to facts, figures, ideas, concepts while carriers refer to information sources and channels where the content always resides, accessed and exchanged. Subsequently, the content nature of information needs refers to users' needs for facts, figures, concepts, and ideas in order to fill in felt gaps in knowledge. The non-content needs refer to how users' need the desired content to be made available for their access and use in their own setting. A particular need regarding how information content has to be made available occurs because unless the content is made available in a way that is suitable for users' access and use, the content remains out of the reach of users. This results in failure in filling the gap in knowledge for which the content is needed. The non-content needs are carrier related because they arise in connection with the capabilities of the existing carriers for users' access and use as well as the level of skills of users to interact with the carriers. Therefore, users experience carrier related needs along side the content needs because content always resides in some carrier and that carrier has to be accessed and used in order for the content to be received by users for filling gaps in knowledge. To be within the reach of users, the content has to be accessible and usable within the capabilities of the existing carriers and level of users' skills to interact with the carriers.

The conceptualization further states that information needs of users are unique to each physical form in which information content is stored, accessed, retrieved, and exchanged. If information needs are accepted as being related to both the content and carrier aspects of information, therefore users' needs arising from the different carriers of the different physical forms in which information content exists should be recognized. The physical forms in question are the print and the electronic forms. Information needs vary with the physical form in which information content is made available because the nature of carriers of the print and electronic forms vary. The variation in the nature of carriers leads to varying carrier related needs which will be reflected in the overall information needs that users experience. How users in a given setting need the desired information content to be made available for them in electronic form depends on the state of capabilities of the electronic carriers such as the computer networks and electronic



databases that are currently existing in their own setting. It is also dependent on the skills of the users in interacting with the existing electronic carriers for the purpose of accessing and using the relevant electronic content residing in the carriers. The same content will be needed by the users to be made available differently if it is in print form. Users of that setting will need the desired content to be made available within the constraints of using the existing print carriers.

The conceptualization also contends that information needs are dynamic, cognitive, subjective, situational, and non-specifiable because content needs are dynamic, cognitive, subjective, situational, and non-specifiable. Content needs of users are dynamic in that they evolve and become clearer as users interact with potential information resources. They are dynamic as well in that a given content need could lead to a totally new content need. The conceptualization also views content needs as situational because they arise from specific situations that users encounter in life. Content needs are considered cognitive as they occur in the minds of the users. They are also considered cognitive because the state of users' knowledge is directly involved in determining the nature of their information needs. Only the individual who is experiencing content needs knows that they are occurring and only that individual determines ultimately what will fulfill his needs. This makes content needs subjective and unique. Finally, content needs are viewed as non-specifiable by users because content needs reflect users being in an anomalous state of knowledge regarding the tasks encountered.

Thus, the model and the assumptions have helped in generating an alternative conceptualization of the information needs of users. The conceptualization is argued to be alternative because first, the model has brought to light a new essence of information needs in the electronic information environment. It advocates a new way of looking at the information needs of users, namely that they are by nature arising from user tasks, the state of electronic information resources, and user experience. Second, it advocates assumptions that have not received due attention in the existing conceptualizations. Third, it has allowed one to develop a unique research focus in order to determine information needs of users in the electronic information environment. As later discussion will show, a framework to determine the information needs of users in the electronic

information environment has been proposed based on the notions of the model. Therefore, the model developed and the assumptions and premises identified have helped in generating an alternative conceptualization which was the aim this research.

#### **6.2.8.2 Developing a research approach**

As a distinct conceptualization, the proposed conceptualization is in a position to help in the identification of research focuses and methodologies to use for determining information needs of users in the electronic information environment. By pointing out the variables and their relationships that constitute the information needs of users in the electronic information environment, the model has already identified research focuses or areas of investigation in order to determine information needs of users. Each of the component elements of the model is an area in which data has to be collected in order to determine information needs of users in the electronic information environment. More specifically, according to the model, data are required on the state of the electronic information resources that a user is currently using in his setting, the user's level of skills and familiarity with the existing electronic information resources, and the user tasks or activities that the user engages in. A clearly identified research focus in turn facilitates identification of appropriate research methodologies. As pointed out in Chapter two of this thesis, the choice of methodologies is governed by the research focuses. Consequently, the identified research focuses make it easier to select appropriate methodologies to employ in determining the information needs of users. In this regard, all potentially applicable methods of collecting data on the variables pointed out by the model are to be employed. As a step forward, an approach to study the information needs of users in the electronic information environment has been proposed based on the ideas of the model (Kebede, 2000). The proposed approach is briefly discussed below.

The proposed framework features key variables on which data have to be collected; the specific aspects of each variable on which data need to be collected; the sources from where the data on each variable has to be collected; and the methods of data collection for each of the variables. Accordingly, the proposed framework has users' tasks, state of electronic information resources, ease of use of these and users' experience as its basic



variables on which data need to be collected in order to determine the information needs of users in the electronic information environment in each setting. It further points out selected aspects of each variable on which data regarding the variable need to be collected. Data on selected aspects of each of the variables are to be collected from different sources, including end-users and information personnel. But on no occasion are users to be questioned directly about what their information needs are. The data collected on each of these variables are meant to allow experts to infer what content and non-content related needs that users of each setting are bound to experience. A combination of data collection techniques is indicated to be used to collect the data on each of the variables. In the same way, a combination of appropriate data analyses are to be used on the collected data. With actual implementation and further refinement, the framework is believed to be in a position to provide an improved research approach to be used in information needs research. Therefore, the alternative conceptualization has helped in developing associated research focuses and methodologies for use in information needs research. Although the research focuses and methodologies are specifically for electronic information environment, they are part of the research focuses and methodologies in information needs research.

#### **6.2.8.3 Contributing towards theorization**

The research is also in a position to contribute towards theorization in information needs of users. As it stands, the model provides the initial inputs for developing a theory of the information needs of users. Since theory is understood as a set of relationships among variables, it is possible to see that the model has already provided the basic input for theory building, that is, variables and their relationships. Furthermore, the model already shows the potential to explain some information needs events. For example, why two individuals in different settings or even in the same setting will not have identical information needs can be explained by what the model imparts. In this connection the difference in one of the elements, which is obvious to occur, is responsible for difference in the nature of information needs of individuals. In addition, one can argue that with the further effort of adding the explanatory function to the model a theory in information

needs area can be advanced. Therefore, there is good reason to argue that the model is in a good position to contribute towards theory building regarding the information needs of users.

Based on the discussion of this section, the developed model and the identified assumptions can thus be claimed to be in a position to fulfil the aims of the research, that is, help in gaining more insight into the information needs of users, to allow one to develop an alternative conceptualization of information needs of users in the electronic information environment, to help towards improving a research approach in information needs research, and to contribute towards theorization in the information needs of users in the electronic information environment.

Mainly because of time constraint, no validity evaluation of the model or the specific ways that the model and the assumptions are proposed to be used, is considered in this research. Relevant evaluations are among the areas recommended for further research.

### **6.3 Conclusions**

Based on the arguments and findings of the research presented in earlier chapters of the thesis, the following conclusions are made.

1. Information exists as content and non-content entity in inseparable way. While content refers to facts, figures, ideas, concepts, and advice, non-content in this research refers to carriers in which information content resides.
2. Information needs occur as content and non-content in nature in an inseparable way. Content needs refer to users' needs for facts, figures, concepts and advice to fill in gaps in knowledge that users experience when what their knowledge about tasks at hand is less than what is required to understand and execute the tasks. Non-content needs refer to how users need the desired facts, figures, and concepts to be made available for their access and use. The non-content needs are also referred to here as carrier related because they arise from the capabilities of the existing carriers in facilitating access and use of information content residing in



them as well as the level of skills of users in interacting with the carriers for the purpose of accessing and using the content residing in the carriers.

3. The information needs of users in the electronic information environment are composed of content and non-content types arising from user tasks, state of existing electronic information resources and level of user experience with the existing electronic information resources in each setting. Tasks that users encounter and the current state of knowledge of users in relation to the tasks lead to content needs of users, that is facts, figures, ideas. The state of electronic information resources and the level of users' skills in interacting with the existing electronic information resources in each setting lead to how users need the content to be made available for their access and use. In other words, the information needs of users in the electronic information environment are to have relevant content that is accessible and usable within the constraints of existing electronic information resources and users' individual information skills in each setting.
4. Following the above conclusion, the physical form in which information content is made available for users' access and use influences the information needs of users. This is because the capabilities of existing carriers in facilitating access and use of information content in them and users' skills in interacting with the existing carriers are one of the major factors influencing the nature of information needs of users. The carriers of the different physical forms, namely the print and the electronic forms, vary in their capabilities in facilitating access and use of content residing in them. The skills of the same user in interacting with carriers of the different physical forms also vary. The different carriers, therefore, lead to different carrier related needs. Logically, a change in one of the constituting components of information needs should be reflected in the overall nature of information needs of users. Thus, information needs of users vary depending on whether the desired content is made available in carriers of the electronic form or the print form.
5. The content needs are triggering needs while the non-content needs set further constraints as to the nature of the content that need to be acquired in order to resolve users' gaps in knowledge. Content needs or needs for facts, figures, and

ideas to resolve felt gaps in knowledge occur first and irrespective of the need related to the physical form. Content needs occur irrespective of the type of information environment where they are going to be met. However, the two aspects are inseparable for the existence and meeting of information needs of users. Although the content needs are triggering needs, ultimately resolving the gap in knowledge equally involves meeting the physical form or carrier related needs. Meeting information needs means actually resolving the gaps that users face. Information needed is that which resolves users' gap in knowledge. Thus, to resolve users' gaps in knowledge, the information has to be relevant content presented in a form that allows users to access and use it. The carrier related needs are accompanying needs. They further define what exactly will resolve the felt gap in knowledge or meet users needs in each setting. They determine how information content has to be presented in order to resolve felt gap in knowledge.

6. In order to determine the information needs of users in the electronic information environment, user tasks, state of existing electronic information resources and users' experience with the existing electronic information resources need to be assessed. Based on the results of this assessment, the information needs of users can be inferred and addressed.
7. The model and the assumptions and premises put forward provide an alternative conceptualization to guide information needs research. The conceptualization is alternative because it provides a new way of looking at the essence of information needs in the electronic information environment; it has assumptions that have not received due attention in the existing conceptualizations; and finally, it allows one to identify research focuses of its own. As has been shown earlier, the proposed approach to determine the information needs of users in the electronic information environment has variables unique to it. The focuses have also made it easier to select appropriate research methods to use.
8. The proposed conceptualization of information needs will help contribute to improving the shortcomings of information needs research. By focusing on all relevant issues that are involved in information needs development and satisfaction, the conceptualization contributes towards better meeting users' needs. It is the view in this research that meeting information needs means



resolving users' gaps in knowledge. This requires that every need users have in order to resolve their gaps be considered as a part of their information needs. In other words, considering information needs as composed of content only leads to the identification of content needs only and an attempt to provide just facts, figures, advice. But, this will not be sufficient to resolve users' gap in knowledge. The content has to be made available in a suitable way depending on the nature of the carrier where the content resides and level of skills of the users in interacting with the carrier and the content therein. The techniques and the approaches called for in order to identify content needs only will also be appropriate only for that. Similarly, considering information needs as related to only carriers or systems leads to focusing only on identification of carrier related needs and attempting to meeting those needs. This will not be sufficient to resolve users' gap in knowledge. The techniques and the approaches called for in order to identify carrier needs will also be applicable to identify only carrier related needs. However, the alternative conceptualization not only considers both aspects of information needs as necessary but also specifies what constitutes each aspect. This guides research on what to focus on in order to determine the information needs of users. Thus, by considering all needs that arise in the process of resolving users' gaps in knowledge we can improve the possibility of meeting users' needs.

Furthermore, by bringing to light that information needs vary with varying information environments, the conceptualization contributes towards helping the profession to better meet users' needs. The conceptualization advocates that the difference in the information needs of users arising from the carriers be given due attention if resolving users' gaps is the intention of developing and managing information systems. The argument that information needs vary with the information environment is particularly important as we are at a stage of development where print and electronic based carriers are in wide use for meeting the information needs of users. The different users' needs that these two dominant information environments give rise to have to be recognized, analysed and addressed. If we take for granted that users' needs in different information

environments are not different, we are bound to fail in meeting users needs in at least one of the environments or in both.

It is also the view of this research that the new insight introduced by this research will help the profession in its effort to gain a clearer understanding of the concept of information needs. Basically, every new insight regarding information needs should contribute towards the profession's overall understanding of the concept of the the information needs of users.

9. Related to the above conclusion, the proposed conceptualization has a good chance of being widely accepted. It is hoped that the proposed conceptualization will be accepted widely for two reasons. First it incorporates relevant features from existing conceptualizations. Although in a different way, the conceptualization has reflected that system related needs do exist. As discussed earlier, the non-content aspect of information needs arises basically from the state of the carriers and the level of users' skills with the existing carriers. The conceptualization has also recognized a number of features of information needs that are advocated by the user-oriented conceptualization. That information needs are dynamic, situational, subjective, cognitive and non specifiable as advocated by the user-oriented conceptualization are accepted by the alternative conceptualization.

Second, the conceptualization will enjoy wider acceptance because it incorporates those elements which what have been argued by this research to be lacking in the existing conceptualizations. As indicated above, the conceptualization developed in this research has taken into account that information needs are content and non-content in nature in an inseparable way and that information needs are specific to the information environment. This approach allows one to cover more issues and concerns of information needs which is promising in filling the gap that has been recognized to exist in information needs research.

10. Finally, from a modelling perspective, the model can be claimed to satisfy the major characteristics of models: it has clear purposes or aims; it consists of distinct elements and clearly stated relationships; it is simple, with only a few



elements and relationships; and it has a clear perspective from which it has selected elements and their relationships, namely, factors affecting the information needs of users. Furthermore, the model is in a position to fulfill what models are usually called on to achieve. As stated in chapters one and two of the thesis, models help to bring out the essence of the phenomena they model; help in identifying research focuses or areas of investigation; and help in advancing or developing theory about the phenomena they model. In this connection, the model has brought out the essence of information needs of users in the electronic information environment, has helped in identifying research focuses and related methodologies, and has proved its potential to contribute towards theorization in information needs.

#### **6.4 Recommendations**

The following recommendations are proposed to make the most of the results of the research.

1. It is recommended that the model be discussed and promoted among information needs researchers. This has a dual purpose. First, it will attract constructive comments and criticisms from experts in the area. Second, it will help to create awareness among information needs researchers that an alternative conceptualization and associated research focuses and methodologies exists for consideration.
2. It is recommended that the proposed research approach be implemented. This will allow researchers to identify and address weaknesses and strengths of the approach before its wider application.
3. The following are also recommended as areas for further research:
  - 3.1 Continually assess the usefulness and accuracy of the model through feedback from experts in information needs research. Although the model is presented in this thesis as sound for the purpose for which it is developed, expert opinions and lessons from practically implementing the model will provide useful feedbacks. Such feedbacks will only enhance the quality and the usefulness of the

model and the conceptualization that has emerged from the model and the assumptions identified. Since it reveals a new concept of the essence of information needs, feedbacks from those involved in information needs research will help to refine the model.

- 3.2 Conduct research aimed at leading to theorization. As indicated earlier, the initial input for theorization namely, variables and relationships, related to information needs have already been revealed by the model. With further research in relation to these initial inputs, developing a new theory in information needs is a possibility. Although theory building is a complex process, it has been pointed out that the identification of variables or concepts, developing hypothesis regarding the relationships among variables, and validating the hypothesis pave the way for developing theory in the area under consideration. In this connection a number of testable hypotheses can be generated from the model which could lead to developing theories in information needs.
- 3.3 Investigate other areas in information science where the model can be used profitably.
- 3.4 Conduct study to determine the degree of influence of each variable of the model and its dimensions on the information needs of users in the electronic information environment.
- 3.5 Develop a model of the information needs of users in the print information environment and identify related assumptions that accompany the model. This will allow one to understand the essence of information needs of users specifically in the print information environment. A model and related assumptions in the context of the print information environment will also help specify the research focuses and associated research methodologies for determining the information needs of users in this information environment.
- 3.6 Develop generalization regarding the nature of information needs based on similarities and differences of the models and assumptions of print and electronic information environments.



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