CHAPTER-I
INTRODUCTION

Information is power. Where information is concerned, there are the haves and the have-nots. The information rich and the information poor. People go bankrupt and even lose their lives in the pursuit of information. Thus we are no strangers to the power of information. Our very lives depend on it. That information exists goes without saying. We talk about it, we seek it, we exchange it and we pay for it. Ironically though, despite our familiarity with information, we have not been able to properly define the term.

Some attempts at defining the term ‘information’ are "Information is any stimulus that reduces uncertainty" \textit{Shannon and Weaver}.

\textbf{Ching-Chih Chen and Peter Hernon} define information as, "all knowledge, ideas, facts, data, and imaginative works of mind which are communicated formally and/or informally in any format."

Ask a person what ‘information’ means and pat will come the reply, "Information is facts (or data, or knowledge, even wisdom)". Many terms are used as synonyms or near-synonyms of information and this creates a lot of confusion. There is a very thin line drawn between the meanings of all the terms mentioned above and that of information. While it is not altogether wrong to call information data or facts or even knowledge-yet it may be that either some of these terms (data, facts) are only a part of information or that information is a part of them (knowledge, wisdom). An understanding of each term may clear the confusion:

**Facts** - Things known to have happened or to be true or to exist.
**Data** - Data is the smallest element of information. Data are language, mathematical or other symbolic surrogates which are generally agreed upon to represent people, objects, events and concepts.

**Knowledge** - Knowledge is an organised set of statements of facts or ideas presenting a reasoned judgement or an experimental result which is transmitted to others through communication medium in some systematic form.

From the above definitions, it is clear that the three concepts are interrelated - in the sense that one is the building block of the other. The interrelationship can be better understood from the following example:

<table>
<thead>
<tr>
<th>Data</th>
<th>Raw Material</th>
<th>Cotton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information</td>
<td>Intermediary</td>
<td>Yarn</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Finished Product</td>
<td>Cloth or further</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data</th>
<th>Raw Material</th>
<th>Yarn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information</td>
<td>Intermediary</td>
<td>Cloth</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Finished Product</td>
<td>Suit</td>
</tr>
</tbody>
</table>

Wisdom on the other hand is an individual trait, which comes to one through acquisition of sound knowledge, and the related virtues gained through age and experience. The trait may comprise among others, ability to see far ahead into the future, have a vision of things to come and judgement in selecting the right alternatives among several others available, for making a decision. While it is the highest form of knowledge, wisdom cannot be transferred, it can only be acquired.

Although the terms ‘information’ and data are often used interchangeably, there is a crucial difference between the two. Information consists of classified and interpreted data that are being used for decision-making. It is definitely different from data. Access to data does not automatically convert itself into information.
Inference and interpretation are required. Some data can be disinformation.

According to Fritz Machlup the difference between information and knowledge can be understood as follows:

1. Information is piecemeal, fragmented and particular while knowledge is structured, coherent and universal.
2. Information is timely, transitory, perhaps even ephemeral whereas knowledge is of enduring significance.
3. Information is a flow of messages while knowledge is a stock largely resulting from that flow.
4. Information is acquired by being told while knowledge is acquired by thinking.

1.1 Origin of information

This information that is so vital to human life, where does it come from? An in-depth study of how information is generated would be a difficult task, but it can safely be concluded that research is one of the better known areas where information takes root. Most of what we know today is a result of research. The work of experts in the fields of science, technology, social science and the humanities continue to give birth to information that is beneficial to the whole society. The government, understanding the major role that Research and Development (R&D) plays, also continues to pour funds into these fields as a result of which more and more information is generated so much so that the world is being bombarded with information leading to the phenomenon termed information explosion.

When governmental and non-governmental organisations perform their routine duties, they are also generating information whether or not they are aware of
the fact. For example, the police department provides vital information about such burning topics as terrorism, corruption and the like, in the course of carrying out its routine duty of maintaining law and order. In the same way other government departments are also responsible for a lot of information available to us.

Business and industrial information is generated by the activities of business and industrial organisations. Social and political information is made available to us through the recordings of the people (historians, critics, political commentators etc.) who lived in different ages or eras.

1.2 Sources of information

The generated information cannot just float about in air just as water is contained in a vessel, so too is information contained in different sources. Information finds its way into the following types of sources:

Primary sources such as periodicals, research reports, conference proceedings, patents, standards, trade literature, theses etc.

Secondary sources such as - indexing and abstracting periodicals, reviews of progress, reference books (encyclopaedia, dictionaries, handbooks, tables, formularies etc.), treatises, monographs, textbooks etc.

Tertiary sources such as yearbooks and directories, bibliographies, guides to the literature, lists of research in progress, guides to libraries and sources of information, guides to organisations etc.

There are also audio-visual sources such as filmstrips, slides, video and audio-tapes etc.

Most of the printed sources are also available online now. Further, these sources are found in bookstores, libraries, information centres etc.
1.3 Properties of Information

1. Information is not consumed in its use.
2. It can be shared by many and can be used simultaneously without any loss to anyone.
3. It is the most democratic resource in that it can be consumed by poor and rich alike depending upon the intake capacity.
4. Information is dynamic, ever growing and continuing and no final word is said or will ever be said on any aspect of it.

1.4 Types of Information

According to Shera J.H there are six types of information:

(a) Conceptual information - relating to ideas, theories and hypotheses about the relationship which exists among the variables in an area.

(b) Empirical information - relating to data and experience of research which may be drawn from oneself or communicated through others.

(c) Procedural information - this is the data obtained, manipulated and tested through investigation.

(d) Stimulatory information - is motivated by oneself or the environment.

(e) Policy information - is focussed on the decision making process.

(f) Directive information - is used for coordinating and enabling effective group activity.

1.5 Uses of Information

1. Information as process – when someone is informed, what they know is changed. Information process has been explained by the Oxford English Dictionary as, "The act of informing; communication of the knowledge or ‘news’ of some fact or occurrence; the action of telling or fact of being told of something."
2. Information as knowledge - Information is also used to denote the knowledge communicated concerning some particular fact, subject or event; that of which one is apprised or told; intelligence, news.

3. Information as thing - The term 'information' is also used attributively for objects, such as data and documents.

1.6 Qualities of information

If information is to be effective, it has to have the following qualities. They are self-explanatory:

(i) Accessibility     (ii) Comprehensiveness
(iii) Precision       (iv) Compatibility
(v) Timeliness        (vi) Clarity
(vii) Flexibility     (viii) Verifiability
(ix) Unlashes        (x) Quantifiability

*Brophy*, provides more or less the same list of qualities as the above with the addition of qualities like relevance, historicity, completeness and reliability. His explanation of the importance of relevance and timeliness are worth noting.

i. **Relevance** - Information that is not relevant is not information at all, but data. Irrelevant information is known to be counterproductive. This was stated in a report by the American Accounting Association which stated, "To have information used for purposes for which it has no relevance is likely to be worse than having no information at all."

ii. **Timeless** - The timeliness of information is particularly critical in the managerial situation. If the information arrives too late, the decision will already have been taken. If it arrives too early, its significance will be lost at the crucial moment, perhaps because of 'information overload', or it will
appear to be irrelevant, will be ignored and may not be recalled later.

1.7 Information overload

Innovations in information technology, such as the printed book, the periodical magazine or journal, the abstracting journal and the computer have all led to complaints that it is impossible to keep up with the amount of information available.Torrents and rivers of current literature pour themselves into libraries, adding, without cease, to what is already there. This is information overload.

The term 'information overload' is usually taken to represent a state of affairs where an individual's efficiency in using information in his work is hampered by the amount of relevant and potentially useful information available to him. It is usually associated with a loss of control over the situation, and sometimes with being overwhelmed. The problem was affecting the effectiveness and even the health of professional workers, particularly managers in businesses, and was severely affecting the efficient working and productivity of organisations.

Information technology is considered to be the major cause of information overload. Paradoxically it has also provided the tools to help solve the problem. It is thus a 'two-edged' sword.

One of the solutions for overcoming the problem is Selective Dissemination of Information (SDI). A need is felt for an intelligent agent to filter incoming material, and/or scan for interesting things in a variety of sources.

Information professionals also have a role in combating information overload. This they can do through traditional information-handling skills like creating catalogues of web resources and providing advice of focused searching. While earlier it was their duty to identify and access all relevant information, they now have to take on the role of protecting the users from information.
It is quite evident that information is vital to every individual there is no aspect of a person's life where information is not required. That there is such a thing as 'information need' goes without saying. The problem (as is the case with the term 'information') again lies in the difficulty of finding a proper definition. Crawford S agrees that 'information need' is a difficult concept to define, to isolate and especially to measure. It involves a cognitive process, which may operate on different levels of consciousness, and hence may not be clear even to the inquirer himself. In order to understand the concept of 'information need' one has to first define the term 'need'. But the use of terms like 'want', 'requirement,' 'demand' etc. to explain the term 'need' further complicates matters.

1.8 Information Need

i. What a person ought to have

ii. Circumstances under which something is lacking therefore requiring some course of action.

iii. That which one cannot do without

iv. That which is necessary for an organism’s health and well being

The Encyclopaedia of Psychology has given a comprehensive and clear explanation of the term 'need' - "Need is one of the several English words (the others being drive, motive, want, urge, desire and so on) - each in some respects unsuitable - used by psychologists today to designate an internally or externally aroused, brain-located force (often coupled with an accelerating emotion), subjectively experienced as an impulsion or felt necessity (a mild or intense urge) to act (immediately or later) so as to produce a certain specifiable terminal effect which is ordinarily expected to be beneficial to the actor, and/or positively hedonic (less painful, more pleasurable) relative to the arousing situation."
Human needs are of two types: Physical and Psychological. Physical needs are requirements for a healthy body (e.g., food, water, and air). Psychological needs are requirements for mental health (e.g., self-esteem, pleasure).

According to Maslow, the different types of human needs are:

- **Self-actualising needs** - formal education, leisure activities, ethics, values, etc.
- **Esteem needs** - multicultural awareness, emotional awareness, social system knowledge (legal, economic etc.), sex education, ethics, values etc.
- **Love and belonging needs** - multicultural awareness, emotional awareness, leisure activities, interpersonal skills, ethics and values, sex education etc.
- **Safety needs** - crime avoidance, traffic rules, emergency procedures, basic literacy, sex education etc.
- **Physiological needs** - personal hygiene, nutrition, general health issues, AIDS prevention, drug, tobacco and alcohol abuse, child abuse, sex education.

<table>
<thead>
<tr>
<th>Want</th>
<th>What a person would like to have</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand</td>
<td>What a person asks for</td>
</tr>
<tr>
<td>Requirement</td>
<td>this can cover need, want and demand</td>
</tr>
</tbody>
</table>

**The difference between 'need' and 'want'**

One basic difference between need and want is that - a person may not need what he wants. Green finds that the element that most clearly distinguishes a need from a want or a demand is that there is no necessary self-awareness of a need. People frequently need things without being aware of the need.

Line is of the opinion that people do not feel a want for all they need to help them in their study or for that matter their, gardening; and they sometimes
want what they do not need. We all like foods that are not good for us; a drug user needs to be helped off drugs but rarely wants to. Likewise, people do not always demand what they want, often because they do not expect to get it.

We now have a fairly good idea as to what the terms 'information' and 'need' mean. The next step is to understand the meaning of the term 'information need.' Some attempts have been made at defining the term:

Maurice B. Line has defined information need as. "what, an individual ought to have for his work, his research, his edification, his recreation etc.

According to Brenda Dervin "an information need is an impediment preventing an individual from moving forward in cognitive time and space. The person is faced with a gap that must be bridged by 'asking questions, creating ideas, and/or obtaining resources' " Such gaps do not occur in the abstract but arise out of particular critical events and situations".

Ching-Chih Chen and Peter Hernon stress that an information need is more than a question asked of an information provider. It occurs whenever people find themselves in situations that require some form of knowledge for resolution.

The Librarian's Thesaurus defines information need as "that need which library services or materials are intended to satisfy.

1.9 Methods of determining information needs

According to Soper, community analysis is one method used by librarians to identify characteristics of a target population and to decide what library services and information would be most appropriate for them. The techniques that are used in community analysis include observing environmental characteristics, studying demographics, observing patterns of library use and interviewing key informants'.

Roger Greer and Martha Hale too support community analysis as the basis for determining a library's role. Their method involves data collection and
analysis from four perspectives: demographics, community organisations, service & product providing agencies and lifestyles.

**Brenda Dervin**'s sense-making methodology is one of the most widely adopted techniques for conducting needs assessments. The researcher tries to find out, with the help of timeline interviews, about the efforts put in by an individual to acquire information in order to bridge a gap in a particular critical incident.

**Robert Grover** has presented a conceptual model for diagnosing information needs in the context of a school library media programme. He proposes a two-stage process: systematic analysis of both the school and the community followed by one-on-one interaction with a user at the point when he or she has decided to seek information, i.e. the reference interview. He asserts that the reference interview can become a vehicle for diagnosing information need by applying knowledge of information psychology - how individuals seek, acquire, organize, process, utilize and store information.

### 1.10 Types of information need

**Tague, J, et.al.,** has presented the following types of information needs (most of which are self explanatory)

1. Social or pragmatic information needs - required for coping with day-to-day life.
2. Recreation information needs.
3. Professional information needs.
4. Educational information needs.

Another categorisation can be the following:

Success needs - for employment opportunities, self-improvement (dress,
speech, personal carriage etc.)

Specialised information needs - for the physically handicapped, emotionally disturbed, geographically isolated, the non-English speaking groups etc.

1.11 Factors affecting information needs

By far, the most important factor that affects the information needs of an individual is the type of work in which he is involved - as found by Lin and Garvey. Another factor (relating to type of work), is - whether the work is basic or applied.

The discipline, within which an individual is working also affects his information needs - for example, the information needs of researchers in the pure sciences is probably more urgent than that of researchers in the social sciences, because science is ever growing. The scientist will need to constantly update his knowledge - i.e. he has to catch-up with the latest developments.

Other factors include - social, political, economic and legal.

1.12 Information seeking behaviour

When a need is felt for anything, more often than not, people take action in order to satisfy that need. Different strategies or modes of action are resorted to. The same applies for the satisfaction of information needs. An individual realizes that he needs information, he knows that in all probability the information will not come to him on its own, therefore he has go to about seeking it What strategies or processes he resorts to, in order to satisfy the need for information, is the focus of study here.

Ching-Chih Chen has defined information seeking as follows, "Information seeking patterns are the paths pursued by the individual in the
attempt to resolve a need."

According to Girja Kumar, “Information seeking behaviour is mainly concerned with who needs what kind of information for what reasons; how information is found, evaluated and used.”

'Wilson T.D. defines what he calls 'information behaviour' as, "those activities a person may engage in when identifying his or her own needs for information, searching for such information in any way, and using or transferring that information."

1.13 The information seeking process

Many models have been framed in order to explain the information seeking process. A model is a framework for thinking about a problem and may evolve into a statement of the relationships among theoretical propositions or put more simply, models are statements, often in the form of diagrams, that attempt to describe an information seeking activity, the causes and consequences of that activity, or the relationships among stages in information seeking behaviour. Some of the models that have been developed so far are given below:

1.13.1 Information behaviour

A model may be described as a framework for thinking about a problem and may evolve into a statement of the relationships among theoretical propositions. Most models in the general field of information behaviour are of the former variety: they are statements, often in the form of diagrams, that attempt to describe an information seeking activity, the causes and consequences of that activity, or the relationships among stages in information-seeking behaviour.
Rarely such models advance to the stage of specifying relationships among theoretical propositions: rather, they are at a pre-theoretical stage, but may suggest relationships that might be fruitful to explore or test. Models of information behaviour, however, appear to be fewer than those devoted to information-seeking behaviour or information searching.

The aim of this model was to outline the various areas covered by what the writer proposed as information-seeking behaviour, as an alternative to the common information needs, but it is clear that the scope of the diagram is much greater and that it attempts to cover most of what is included here as information behaviour.

The model suggests that information-seeking behaviour arises as a consequence of a need perceived by an information user, who, in order to satisfy that need, makes demands upon formal or informal information sources or services, which result in
success or failure to find relevant information. If successful, the individual then makes use of the information found and may either fully or partially satisfy the perceived need - or, indeed, fail to satisfy the need and have to reiterate the search process. The model also shows that part of the information-seeking behaviour may involve other people through information exchange and that information perceived as useful may be passed to other people, as well as being used (or instead of being used) by the person himself or herself.

1.13.2 Information-seeking behaviour


Wilson, 1981

Wilson's second model of 1981 is based upon two main propositions: first, that information need is not a primal need, but a secondary need that arises out of needs of a more basic kind; and second, that in the effort to discover information to satisfy a need, the enquirer is likely to meet with barriers of different kinds.

Wilson proposes that the basic needs can be defined as physiological, cognitive or affective. He goes on to note that the context of anyone of these needs may be the person him- or herself, or the role demands of the person's work or life, or the environments political economic, technological, etc. with in which that life or work takes place. He then suggests that the barriers that impede the search for information will arise out of the same set of contexts.
This model is shown in a simplified version (which also shows the search behaviours defined by Ellis.D.et.al (1997) in Figure 2. above. Wilson's model is clearly what may be described as a macro model or a model of the gross information-seeking behaviour and it suggests how information needs arise and what may prevent (and, by implication, aid) the actual search for information. It also embodies, implicitly, a set of hypotheses about information behaviour that are testable: for example, the proposition that information needs in different work roles will be different, or that personal traits may inhibit or assist information seeking. Thus, the model can be regarded as a source of hypotheses, which is a general
function of models of this kind. The weakness of the model is that all of the hypotheses are only implicit and are not made explicit. Nor is there any indication of the processes whereby context has its effect upon the person, nor of the factors that result in the perception of barriers, nor of whether the various assumed barriers have similar or different effects upon the motivation of individuals to seek information. However, the very fact that the model is lacking in certain elements stimulates thinking about the kinds of elements that a more complete model ought to include.

Dervin, 1983, 1996

Dervin's sense-making theory has developed over a number of years, and cannot be seen simply as a model of information seeking behaviour: it is, rather, as she says, a set of assumptions, a theoretic perspective, a methodological approach, a set of research methods, and a practice. Figure 3. Dervin's sense-making triangle designed to cope with information perceived as, a human tool designed for making sense of a reality assumed to be both chaotic and orderly. However, sense-making is implemented in terms of four constituent elements a situation in time and space, which defines the context in which information problems arise; a gap, which identifies the difference between the contextual situation and the desired situation (e.g. uncertainty); an outcome, that is, the consequences of the sense-making process, and a bridge, that is, some means of closing the gap between situation and outcome. Dervin presents these elements in terms of a triangle: situation, gap/bridge, and outcome, which can be represented as in figure 3.
Figure 3. Dervin’s sense-making triangle

However, it may be preferable to use the bridge metaphor more directly and present the model as figure 4 below.

Figure 4 Dervin’s sense-making model re-drawn

The strength of Dervin's model lies partly in its methodological consequences, since, in relation to information behaviour, it can lead to a way of questioning that can reveal the nature of a problematic situation, the extent to which information serves to bridge the gap of uncertainty, confusion, or whatever, and the nature of the outcomes from the use of information. Applied consistently in 'micro-moment, time-line interviews' such questioning leads to genuine insights that can influence information service design and delivery.

Ellis, 1989 and Ellis, Cox & Hall, 1993

Ellis's elaboration of the different behaviours involved in information seeking is not set out as a diagrammatic model and Ellis makes no claims to the
effect that the different behaviours constitute a single set of stages; indeed, he uses the term 'features' rather than 'stages'. These features are named and defined below:

- **Starting:** the means employed by the user to begin seeking information, for example, asking some knowledgeable colleague;
- **Chaining:** following footnotes and citations in known material or 'forward' chaining from known items through citation indexes;
- **Browsing:** 'semi-directed or semi-structured searching'
- **Differentiating:** using known differences in information sources as a way of filtering the amount of information obtained;
- **Monitoring:** keeping up-to-date or current awareness searching;
- **Extracting:** selectively identifying relevant material in an information source;
- **Verifying:** checking the accuracy of information;
- **Ending:** which may be defined as 'tying up loose ends' through a final search. The strength of Ellis's model as with Kuhlthau's, is that it is based on empirical research and has been tested in subsequent studies. Of the features, Ellis notes that, ‘the detailed interrelation or interaction of the features in any individual information seeking pattern will depend on the unique circumstances of the information seeking activities of the person concerned at that particular point in time'. However, it is clear that starting must initiate a process and first ending must end it.

It also seems reasonable to suggest that verifying is a penultimate stage in a process and that extracting must follow on from specific search behaviour such as browsing. Indeed, drawing attention to this fact, leads to the conclusion that extracting is not an information behaviour of the same kind as browsing, or
chaining or monitoring. It further suggests that differentiating is also a different kind of behaviour: browsing, chaining and monitoring are search procedures, whereas differentiating is a filtering process and extracting may be seen as an action performed on the information sources. The remaining behaviours do not necessarily take place in a specific sequence and may be initiated in different sequences at different times in the overall search process. Ellis's account, therefore, in terms of the different kinds of features it embodies, appears to sit between the micro-analysis of search behaviour (starting, chaining, extracting, verifying, ending) and a more macro-analysis of information behaviour generally (browsing, monitoring, differentiating).

![Diagram](attachment:process_model.png)

**Figure 5 A process model based on Ellis's characteristics**

Thus, the models of Wilson and of Ellis are intended to function at different levels of the overall process of information seeking and this fact is demonstrated by the ability to nest one within the other.

**Kuhlthau, 1991**

Kuhlthau's work complements that of Ellis by attaching to stages of the 'information search process' the associated feelings, thoughts and actions, and the appropriate information tasks. This association of feelings, thoughts and actions clearly identify Kuhlthau's perspective as phenomenological, rather than cognitive.
The stages of Kuhlthau's model are initiation, selection, exploration, formulation, collection and presentation. As an example, the initiation phase of the process is said to be characterized by feelings of uncertainty, vague and general thoughts about the problem area, and is associated with seeking background information: the 'appropriate task' at this point is simply to 'recognize' a need for information. The remaining appropriate tasks are: Identify - that is, fix the general topic of the search;

Investigate, or search for information on that general topic; Formulate - focus on a more specific area within the topic; collection, that is, gather relevant information on the focus; and complete - end the information search. Kuhlthau's model is thus more general than that of Ellis in drawing attention to the feelings associated with the various stages and activities. The fundamental proposition is that the feelings of uncertainty associated with the need to search for information give rise to feelings of doubt, confusion and frustration and that, as the search process proceeds and is increasingly successful, those feelings change: as relevant material is collected confidence increases and is associated with feelings of relief, satisfaction and a sense of direction. In effect, what Kuhlthau postulates here (and confines by empirical research) is a process of the gradual refinement of the problem area, with information searching of one kind or another going on while that refinement takes place. Thus, a successive search process is implicit in Kuhlthau's analysis of the search activity. It is interesting to explore whether the Ellis and Kuhlthau models may be brought together, and this is attempted in Figure 6 below, where Wilson's model representation of Ellis's categories is accompanied by the stages of Kuhlthau.
Stage: Initiation selection/exploration   Formulation  Collection  Presentation

Figure 6 A comparison of Ellis’s and Kuhlthau’s frameworks

Through this merger of the two models, we can see strong similarities and the major difference appears to be that Ellis specifies the modes of exploration or investigation. The point must be reiterated, however, that Ellis does not present his characteristics as stages but as elements of behaviour that may occur in different sequences with different persons, or with the same person at different times, Thus, the two models are fundamentally opposed in the minds of the authors: Kuhlthau stages on the basis of her analysis of behaviour, while Ellis suggests that the sequences of behavioural characteristics may vary.

Wilson, 1996

Wilson's 1996 model (Figure 7) is a major revision of that of 1981, drawing upon research from a variety of fields other than information science, including decision-making, psychology, innovation, health communication, and consumer research. The basic framework of the 1981 model persists, in that the person in context remains the focus of information needs, the barriers are represented by intervening variables and information-seeking behaviour is identified. However, there are also changes: the use of the term intervening variables serves to suggest that their impact may be supportive of information use
as well as preventive; information seeking behaviour is shown to consist of more types than previously, where the active search was the focus of attention; information processing and use is shown to be a necessary part of the feedback loop, if information needs are to be satisfied; and three relevant theoretical ideas are presented: stress/coping theory, which offers possibilities for explaining why some needs do not invoke information seeking behaviour; risk/reward theory, which may help to explain which sources of information may be used more than others by a given individual; and social learning theory, which embodies the concept of self-efficacy, the idea of 'the conviction that one can successfully execute the behavior required to produce the (desired) outcomes

Thus, the model remains one of macro-behaviour, but its expansion and the inclusion of other theoretical models of behaviour makes it a richer source of hypotheses and further research than Wilson's earlier model. We can also attempt to relate this model to the others discussed above. It is fairly obvious that the models of both Ellis and Kuhithau relate to the active search mode of information seeking behaviour and provide, in effect, an expansion of that box in the diagram Figure 7. Dervin's model is completely different in character, since its aim to provide a framework for exploring the total it of information behaviour from the exploration of the context in which information needs arise to the means whereby that need is satisfied, whether through active searching or otherwise. In effect, it is a model of a methodology, rather than a model of a set of activities or a situation.
The emergent concepts were grouped into three core categories: opening, orientation, and consolidation, around which detail relating to their definition, function and context continued to be developed through further analysis. The new model of interdisciplinary information seeking is represented in terms of three core processes and three levels of contextual interaction in Figure 8. The following sections provide an overview beginning the core processes of opening, orientation, and consolidation at the center of the Figure 8, and moving on to discuss their interface with the three outer contextual interactions of the mode.
Opening was not as might logically be thought a starting point (Ellis 1989; Kuhlthau 1993). Opening was identified as corresponding to the process of moving from a state of orientation to actually seeking, exploring and revealing information. Interviewees suggested during the member checking process that the term opening best described how they opened up their topics through information-seeking activities. Opening is a non-linear component representing a collection of activities. Each of the activities interacted and informed both further Opening activities and the other core processes. Two activities breadth exploration and eclecticism, were identified as complex in that they involved combinations of other
activities to form a larger process, though these worked alongside other activities. The key element was the combination and recombination of possibilities to achieve information.

Breadth exploration was identified as a conscious expansion of searching to allow exploration of every possibility. This included deliberate expansion of information horizons to bring within range different information types, sources, concepts, and disciplines. Interviewees described it as a 'kind of splatter gun approach' which was associated particularly with starting wider so that narrowing could produce results. Implications of this activity for the orientation process were identified as choice of keywords, selection of sources, and the initiation of combinations of other core processes. Eclecticism encompassed accepting, gathering and storing information from a diverse range of both passive and active sources, sometimes over considerable time periods, for later incorporation and satisfaction of information needs. Eclecticism influenced information seeking as a determination to obtain information from as many channels as possible and to absorb as many pieces of information as possible to reveal new concepts and ideas. Eclecticism provides a conceptual approach to finding information which combines active, passive, and serendipitous information acquisition.

Of the remaining activities, Networking appeared as a significant activity of participants and operated through many channels, including conferences, social gatherings, colleagues, and departmental research groups. The internet, e-mail, and online discussion groups were valued for increasing the possibilities for networking, and hence locating information and sources. Networking was recognised by participants as a tool for exploring inter-disciplinary subjects and opening up new concepts and areas not revealed through traditional searching.
Much of the decision to use Networking was placed in the context of limited knowledge, limited resources such as time and access, and clumping with information overload. Keyword searching during opening was associated with use of databases, online catalogues, Internet search engines, and online journals. Results from keyword Searching were viewed as valuable but sometimes ineffective when terminology was not always appropriate or transferable across disciplines. Browsing was found to be a key process for accessing information, of most use to information seekers who needed to change their disciplinary focus.

Two activities identified in Ellis (1989) were again confirmed by this study. Monitoring through repeat visits to obtain updates has a similar meaning to that used by Ellis and was highlighted in the data as part of the ongoing processes following identification of relevant sources of information. In monitoring, ease of access played a significant role, with reliance on internet websites and particularly home-pages of useful people or organizations, discussion lists, current periodical shelves and new book catalogues. The activity of chaining, identified by Ellis (1989), was found to be strong in the researchers behaviour pattern and was joined here by an emphasis on the chaining of ideas from one source to another. The activity led researchers from single leads in known areas towards a broader information horizon.

Serendipity identified as a method for achieving breadth and identifying unknown results, was found to be closed, associated with browsing, eclecticism, and networking. Serendipitous and activities that encouraged the occurrence of serendipitous results were frequently mentioned as a valued part of information seeking, as illustrated in more depth in Foster and Ford (2003).
**Orientation**

Orientation processes, or as one interview suggested, 'finding which way was up', encompass a diverse range of activities covering the identification of existing research, key themes, disciplinary communities, latest opinion, sources, keywords, and picture building. In some ways orientation performs many of the basic problem solving aspects identifiable in previous research. Orientation focuses on identification and in which direction to look. The activities and strategies found in the opening process feed results into the orientation process, but opening can also lead back into further orientation or consolidation in a dynamic interplay.

A primary component of orientation was identified as problem definition, in the classic sense of defining the focus and boundaries of the information problem. It was noteworthy that the process was not clear-cut; participants said they repeatedly redefined problems up to closure of information seeking.

Picture building was a composite set of behaviour patterns that participants described as mapping out in their minds, and on paper, the disciplines and concepts relevant to achieving an interdisciplinary overview of the topic. Reviewing was identified as the use of existing knowledge in an area, reading or accessing a personal collection and considering material already gathered. Determining 'where I am now', through reviewing, established a baseline of information from which ideas of 'identifying which gaps need filling next' and 'developing those seeds of information' followed. Other simple processes were identified as part of orientation, thus identifying keywords was finding suitable terms for subsequent searching. Identifying the shape of existing research involved the processes of identifying key names, identifying key articles and identifying latest opinion in disciplines. Identifying and selecting sources required using
relevance criteria to decide which sources were appropriate. Identifying disciplinary communities was deciding on the basis of information, past experience, topic, or general knowledge of which disciplines might be appropriate places to look for information.

**Consolidation**

Consolidating was found to be less likely as a first move in information seeking for many information seekers, although consolidation plays a part in every interaction from an initial idea for a topic or information product. A key theme of consolidation is that of judging and integrating the work in progress and deciding whether further information seeking is necessary. In the context of interdisciplinary research, consolidation looped and intertwined with orientation and opening.

A main concept of consolidation was termed knowing enough, which emerged as an iterative process of questioning of whether sufficient material had been acquired to meet the present information need. This was closely connected with refining, which appeared as the process of deciding on boundaries for searches and of selecting a narrower search focus. As information was collected and sources highlighted, sifting, the process of deciding which material and sources were relevant, took place. This was a recurrent process of selecting and pruning. The concepts of judging relevance and of relevance criteria were important properties of sifting. Incorporation was identified as a key information organization process. Interviewees found it necessary to pause in their diverse information seeking to assemble the material to which they had been exposed. The process of incorporation took place as a combination of thinking, writing, and discussing with colleagues. Incorporation was recurrent throughout information seeking.

Verifying was a less common aspect of inter-disciplinary information
behaviour. Interviewees reported feeling uncertain of their ability to judge the accuracy of material from other disciplines, but a feeling of information overload prevented their doing additional searching to verify the contents of papers; Interviewees described one other process identified as finishing, described by one participant as 'sweeping up the loose ends' before closure, and composed of activities as diverse as browsing, keyword searching and networking.

- **External context**

The model recognises that information behaviour is not isolated from the context within which the information seeker works. Major external influences were categorised as social and organizational, time, the project, navigation issues and access to sources. Social networking was identified in opening as a source that could have the effect of either reducing access to information resources or significantly bolstering them. At the same time, information-seeking was framed by the resolution of information problems, and by limits to time and financial resources, coded as time and the project. Navigation issues and access to sources referred specifically to the organization of information, and to the problems incurred by inter-disciplinary researchers as they move from the familiar territory of their home discipline towards the alien information environment of other disciplines. The impact appeared to vary with associated factors such as distance from home discipline and previous experience, identified as part of internal context.

- **Internal context**

Internal influences are primarily the level of experience and prior knowledge held by the information seeker. Major influences were categorised as feelings and thoughts, coherence, and knowledge and understanding. Each
represents complex concepts within the analysis, including internal feelings of uncertainty, self-perception, self-efficacy, perception of topic, complexity, and distraction. Knowledge and understanding covers experience, information need, and knowledge level. Internal influences are factors unique to each information seeker's own profile.

**Cognitive approach**

Finally, and most intimately, cognitive approach describes aspects of the mode of thinking observed in the participants, a willingness to identity and use information that might be relevant to an inter-disciplinary problem. The interdisciplinary researchers who took part in the study described three cognitive approaches:

- The flexible and adaptable approach emphasises the mental agility and willingness to adapt to the different information and disciplinary cultures that are intrinsic to working in an inter-disciplinary field.

- Openness of approach is an open-minded approach in which no prior framework for judging relevance is implemented: all sources, disciplines and ideas are viewed as viable until proven otherwise. The concept suggests that interdisciplinary researchers use flexibility and adaptability in their information-seeking and, when they find a potential information source, are open to how this might match their information needs.

- Nomadic thought appeared at first to be the same behaviour as openness. However, it goes further, in that it embraces the process of thinking about a topic in many diverse ways to find the information needed in locations and ways remote from the original idea. Key elements include the idea of abandoning well-known and favored disciplines and sources in search of new material. This tends to contradict the traditional idea of staying within
known disciplines and well-trodden resources.

The holistic approach was highlighted in the earliest interviews as important to grasping and incorporating concepts from diverse areas and bringing them together either as an answer or to generate new questions and information searching directions.

The non-linear model of information seeking illustrates the process of information seeking in a way that reflects the experience of information seekers. The core processes of opening, orientation, or consolidation take account of the interaction between the information seeker's cognitive approach, and their internal and external contexts. Figure 9 illustrates the core processes of the model along with the behaviour associated with each major component of the model.

Figure 9 Non-linear model of information seeking behavior illustrating component behaviour
opportunity, and the need for information seeking change too. The relationship of core processes and developing context interact freely to allow each core process to feed into any other and to be iterative over time.

The names given to the core processes almost suggest a sequence of activity. However, the concepts, represented in the interactivity of the core processes, and the absence of stages in the model, are analogous to and information seeker holding a palette of information behaviour opportunities, with the whole palette available at any given moment. The interactivity and shifts described by the model show information seeking to be non-linear, dynamic, holistic, and flowing.

The non-linear model of information seeking behaviour sought answers to three basic questions relating to the activities of inter-disciplinary researchers, the relationship of processes and contexts, and the representation of these in an empirical model of interdisciplinary information seeking behaviour.

1.13.3 Information seeking behaviour - the nature of the research field

Our overall perspective of the research field of information seeking behaviour is that it constitutes part of the total field of information behaviour, that is, behaviour engaged in by persons in relation to information sources and channels. Information seeking is one such behaviour and implies an active search for information and other information behaviours include, for example, the passive reception of information as when a person watches television advertisements. Information searching is defined as that mode of information seeking that involves interaction with computer-based information retrieval systems. Thus, a nested model, which connects all three concepts.
Figure 10 Nested model

Information seeking behavior has been studies from a variety of perspectives but most often in relation to different groups of people, either differentiated by discipline or by work role or the life problems of the ordinary citizen.

1.13.4 The problem-solving model as a theoretical perspective:

The theoretical perspective adopted is that of information seeking and searching as related to problem solving. Information seeking is defined as goal-seeking behaviour, the goal being the resolution of the problem. A stage process is postulated, in which the individual proceeds from the identification of a problem for investigation (or has such a problem thrust upon them), through the definition of the problem, to its resolution and the presentation of the solution. At each stage it is suggested that some uncertainty, which originally drove the search for information, is resolved. However, the search for information may not fully resolve uncertainty and, therefore, successive searches within the same stage may be necessary, or the search may increase uncertainty and the individual may have
to return to an earlier stage to resolve that uncertainty.

![Problem solving model]

**Figure 11 Problem solving model**

1.14 Significance of the study

The significance of the study is argued on the basis of the following points:

a. The study aims to create awareness among the student community about collection and services of polytechnic college libraries in Tamil Nadu.

b. The study will project the importance and significance of information sources and services of polytechnic college libraries in Tamil Nadu.

c. The study focuses on the required skill to use electronic resources by the student’s community of the polytechnic colleges.

d. The study attempt to highlight the adequacy of the collection and the services with the academic needs of the polytechnic college libraries.

e. The study examines the effective channels through which information is accessed by the students of polytechnic colleges.

f. The study emphasises on the need of user education, training of using electronic sources in the library based on the users responses.
REFERENCES

1) **American Accounting Association. (1996).** "A Statement of Basic Accounting Theory".


7) **Dervin, B. (1983).** An overview of sense making research: concepts, methods and results to date. In International Communications association Annual Meeting. Dallas, Texas.


9) **Dervin, B.** “Audience as listener and learner, teacher and confidence: The sense – making approach”. In Public Communication Campaigns.


17) **Green, A. (1990).** “What do we mean by user needs?” British Journal of Academic Librarianship. 5, pp. 65-78.


30) **Murdick, R.G. and Ross, J.E. (1975).** Information Systems for Modern Management. 2nd ed. (Englewood Cliffs, N.J; Prentice Hall)


32) **Rojas, B.A. (1982).** "Information systems for the scientific management of agricultural research". In. Conference on selected issues in agricultural research in Latin America, Madrid, ISNAR.


34) **Shera, J. H.** The foundation of education for librarianship. New York, Becker and Hayes.


